HYDROLOGIC CONDITIONS IN THE JACOBS CREEK, STONY BROOK, AND BEDEN BROOK DRAINAGE BASINS, WEST-CENTRAL NEW JERSEY, 1986-88

By Eric Jacobsen, Mark A. Hardy, and Barbara A. Kurtz

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 91-4164

Prepared in cooperation with the

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY

West Trenton, New Jersey
1993

U.S. DEPARTMENT OF THE INTERIOR

BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information write to:

District Chief
U.S. Geological Survey
Mountain View Office Park
Suite 206
810 Bear Tavern Road
West Trenton, NJ 08628

Copies of this report can be purchased from:

U.S. Geological Survey
Books and Open-File Reports Section
Box 25425
Federal Center
Denver, CO 80225

CONTENTS

ILLUSTRATIONS

TABLES

CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
square foot (ft^2)	0.0929	square meter
square mile (mi^2)	2.590	square kilometer
cubic foot per second (ft^3/s)	0.02832	cubic meter per second

Temperature Conversion

degree Fahrenheit (°F)	°C = 5/9 x (°F-32)	degree Celsius (°C)

Sea level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929--a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

HYDROLOGIC CONDITIONS IN THE JACOBS CREEK, STONY BROOK, AND BEDEN BROOK DRAINAGE BASINS, WEST-CENTRAL NEW JERSEY, 1986-88

By Eric Jacobsen, Mark A. Hardy, and Barbara A. Kurtz

ABSTRACT

Data on the quantity and quality of ground water and surface water in the drainage basins of Jacobs Creek, Stony Brook, and Beden Brook upstream from U.S. Route 206 in west-central New Jersey were collected in cooperation with the New Jersey Department of Environmental Protection and Energy from October 1, 1986, through September 30, 1988.

Water levels measured in 74 wells during October 1987 ranged from 49 to 453 feet above sea level. The water-table surface generally mimicked topography; however, a water-level altitude of 90 feet measured in one well suggests the possibility of flow between the Stony Brook and Jacobs Creek basins.

Calcium and bicarbonate were, respectively, the most abundant cation and anion in most samples from 25 wells in the study area. Concentrations of nutrients, trace elements, organic carbon, and volatile organic compounds in samples of ground water and surface water generally were less than the U.S. Environmental Protection Agency primary drinking-water regulations. A sample from one well contained 12 micrograms per liter tetrachloroethylene, which exceeds the maximum concentration allowed by New Jersey primary drinking-water regulations (1 microgram per liter).

Surface-water low-flow measurements made twice at 63 sites indicate that both discharge and runoff increased downstream for most reaches of Jacobs Creek, Stony Brook, and Beden Brook. For main-stem sites, the highest base-flow runoff, 0.89 cubic feet per second per square mile, occurred in November 1987 at site 01462733 on Jacobs Creek. The greatest discharge measured was 35 cubic feet per second at site 01401100 on Stony Brook. The highest flows measured by continuous monitoring on Stony Brook occurred in the 1987 water year, and the lowest in the 1988 water year. The flow-duration curve for Stony Brook during 1987 and 1988 indicates a wetter-than-normal period for the area. Results of surface-water-quality analyses indicate that calcium and sodium plus potassium were the dominant or codominant cations, and bicarbonate and chloride were the dominant or codominant anions in the majority of samples. Concentrations of nutrients typically exceeded those needed to support surplus algal growth. Concentrations of trace elements generally were below U.S. Environmental Protection Agency primary drinking-water regulations and commonly were near detection limits, however, three samples contained high concentrations of chromium (140 micrograms per liter in Stony Brook, and 130 and 290 micrograms per liter in Beden Brook).

Bottom-sediment samples from all three streams collected at 11 main-stem sites contained several persistent organic compounds. Significant downstream variations in concentrations of copper and lead were found in Jacobs Creek and Stony Brook.

The macroinvertebrate community was sampled three times at five main-stem sites on each stream. Results indicate an input of nutrients to several stream sections on Jacobs Creek, Stony Brook, and Beden Brook. At site 01401000 on Stony Brook, a reported recent oil spill was evidenced by a reduced population density.

INTRODUCTION

Agricultural and rural areas in Hunterdon, Somerset, and Mercer Counties in west-central New Jersey are being converted rapidly to residential use. Changes in the landscape are readily apparent, but the effects of development on the water resources may remain unnoticed. Understanding the causes of changes in ground-water and surface-water quantity and quality may be useful to planners and water resource managers. The U.S. Geological Survey (USGS) in cooperation with the New Jersey Department of Environmental Protection and Energy conducted a synoptic (temporally short and geographically comprehensive) study of the hydrologic conditions in three contiguous drainage basins in the area: Jacobs Creek, Stony Brook, and Beden Brook (fig. 1).

Purpose and Scope

This report describes the hydrologic conditions in the Jacobs Creek, Stony Brook, and Beden Brook drainage basins and provides a "benchmark" of data against which future changes and effects can be measured. Water-levels were measured once in 74 private wells and continuously in 4 observation wells. Stream-discharge measurements were made twice at 63 sites on the three streams. Water-quality samples were collected once at 25 wells; 7 times (bimonthly) at 3 surface-water monitoring sites; and once at 12 surface-water low-flow sites. Data presented in this report were collected from October 1, 1986, through September 30, 1988.

Previous Studies

The geology and ground-water resources of Mercer County have been described by Vecchioli and Palmer (1962) and Widmer (1965). The geology and ground-water resources of Hunterdon County were described by Kasabach (1966). Vecchioli and others (1969) reported on the occurrence and movement of ground water in Brunswick Group shales at a site in Hopewell Township, Mercer County. A geologic map of the Newark quadrangle that includes the study area was compiled by Lyttle and Epstein (1987). Mansue and Anderson (1974) studied the effects of land use and retention practices on sediment yields in the Stony Brook Basin. Betz-Converse-Murdoch, Inc. (1978), conducted a study of the effects of sewering and increased demand on ground-water resources for Hopewell Township. Reading and Kurtz (1982) described the biology and chemistry of Beden Brook.

Acknowledgments

The authors acknowledge the cooperation of the many individuals, companies, and public-water-supply departments who permitted the sampling and measurement of their ground-water wells. We also thank James Boyle of the New Jersey Geological Survey for providing information and assistance with the location of the wells and measurement of the water levels.

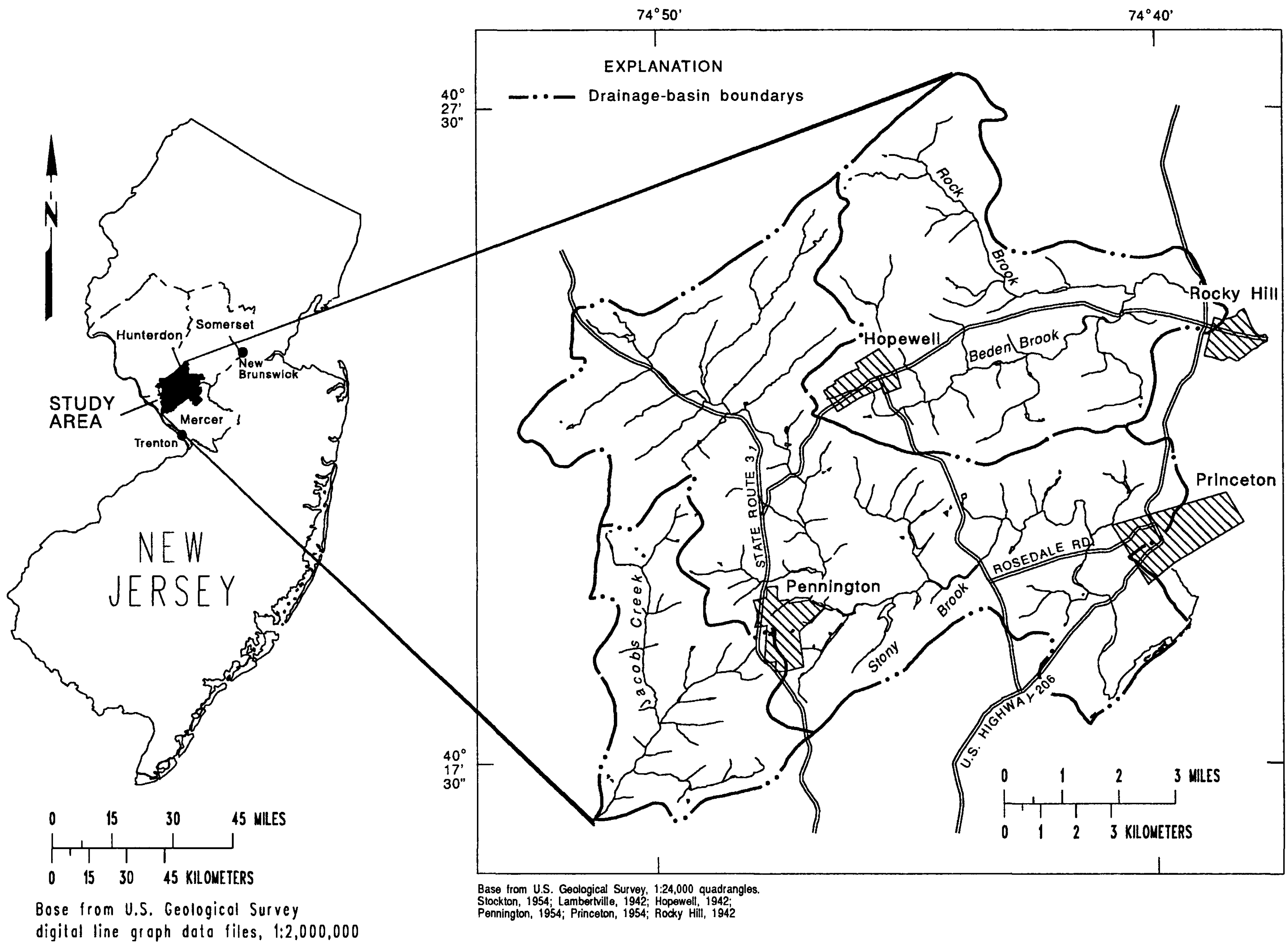


Figure 1.--Location of study area in west-central New Jersey.

DESCRIPTION OF STUDY AREA

Location and Setting

The study area is located in west-central New Jersey and encompasses approximately 90 square miles in Mercer, Somerset, and Hunterdon Counties (fig. 1). It includes the entire Jacobs Creek and Stony Brook drainage basins, and the part of the Beden Brook Basin upstream from U.S. Route 206. In this report, "Beden Brook drainage basin" refers specifically to the area contributing drainage to Beden Brook upstream from U.S. Route 206. The two larger basins, Stony Brook and Beden Brook, drain into the Raritan Bay. The smallest basin, Jacobs Creek, drains into the Delaware River.

The Boroughs of Hopewell, Pennington, Princeton, and Rocky Hill border or lie within the study area. They are primarily residential communities that include or are surrounded by agricultural and woodland areas. Several corporate research facilities also are located within the area. Farms and woodlands still dominate the landscape, but residential development is increasing steadily. Several housing developments and numerous single-family homes were built during the study period, and others have been proposed.

Ground water is the primary source of potable water in the study area. Two water-supply systems serve Hopewell and Pennington Boroughs; most other residential and commercial users obtain their water from privately owned wells.

Climate

The study area has a modified continental climate; extremes in weather conditions are moderated by the proximity of the Atlantic Ocean. Annual precipitation averages about 40 in. along the southeastern coast, 52 in. in the north-central part of the State, and about 44 in. statewide (Schopp and Bauersfeld, 1985).

Figure 2 shows the monthly mean precipitation at the New Brunswick National Oceanic and Atmospheric Administration rain gage (state station number 28-6055) for 1951-80 compared with total monthly precipitation for water years[1] 1987 and 1988. New Brunswick is located approximately 10 mi (miles) northeast of the study area.

Average monthly precipitation from 1951 to 1980 was 45.50 in. Total precipitation for water year 1987 was 54.39 in., 8.89 in. above the 30-year (1951-80) mean. Total precipitation for water year 1988 was 46.76 in., which is 1.26 in. above the 30-year mean.

---

[1] A water year is the 12-month period from October 1 through September 30. It is designated by the calendar year in which it ends.

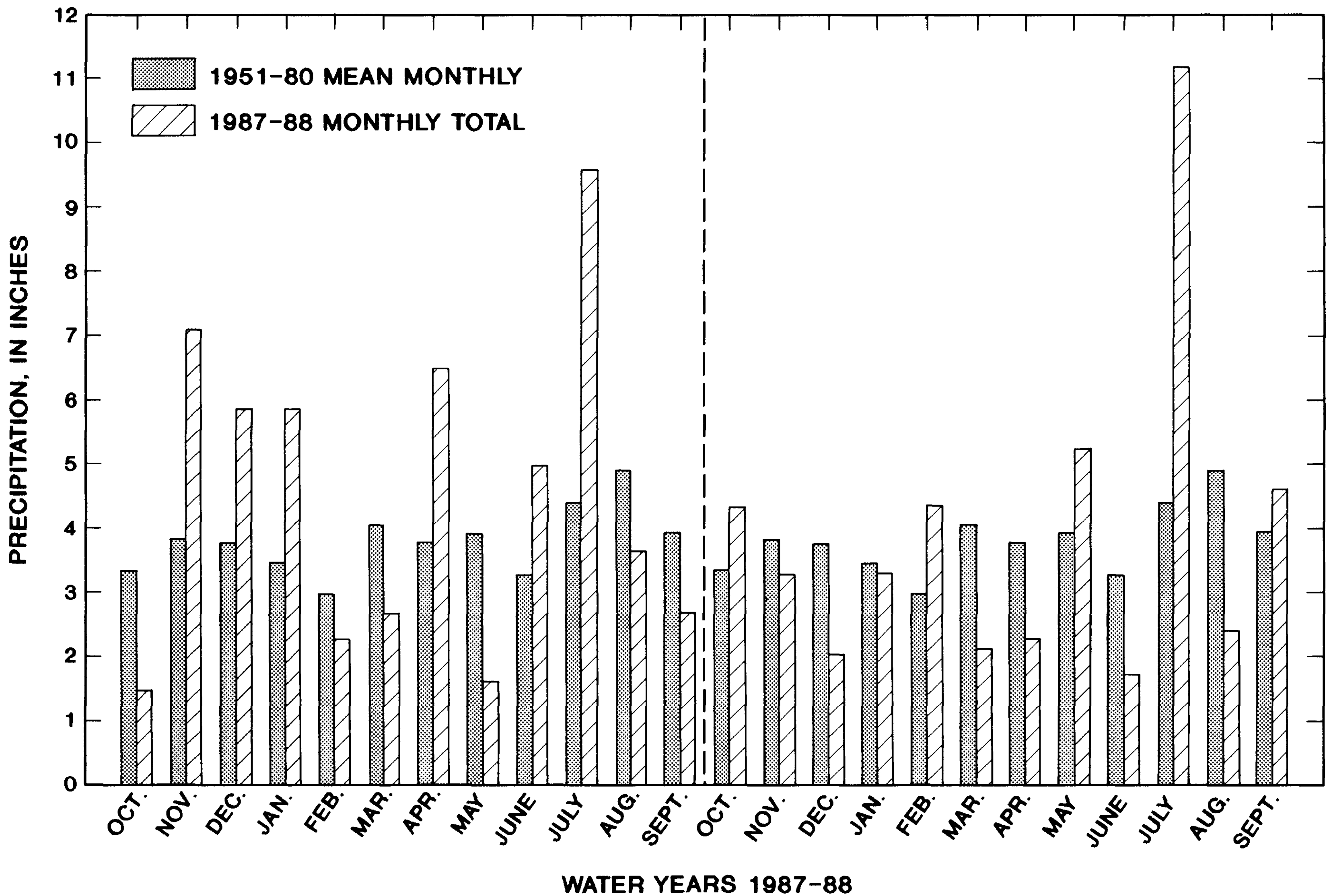


Figure 2.--Average monthly precipitation, 1951-80, and monthly total precipitation for water years 1987 and 1988, New Brunswick, N.J.

Geology

The study area lies entirely within the Piedmont physiographic province. The topography consists of ridges and broad valleys; relief is greatest in the northwestern part and diminishes toward the southeast. Altitude ranges from a high of 552 ft above sea level in the northwest to a low of about 40 ft above sea level on the banks of the Delaware River.

The area is underlain by three formations of the Newark Supergroup of Late Triassic and Early Jurrasic age (fig. 3). The units strike northeast-southwest and dip at about 10 to 15 degrees toward the northwest. The Stockton Formation, the oldest unit, crops out in the southeastern corner of the study area. It is overlain by the Lockatong Formation, which crops out to the northwest, and which is in turn overlain by the Passaic Formation, which crops out in the central part of the study area. This sequence is repeated in the northwestern part of the study area as a result of faulting. The units are cut through and separated in several places by diabase dikes that form some of the steep ridges and mountains in the area.

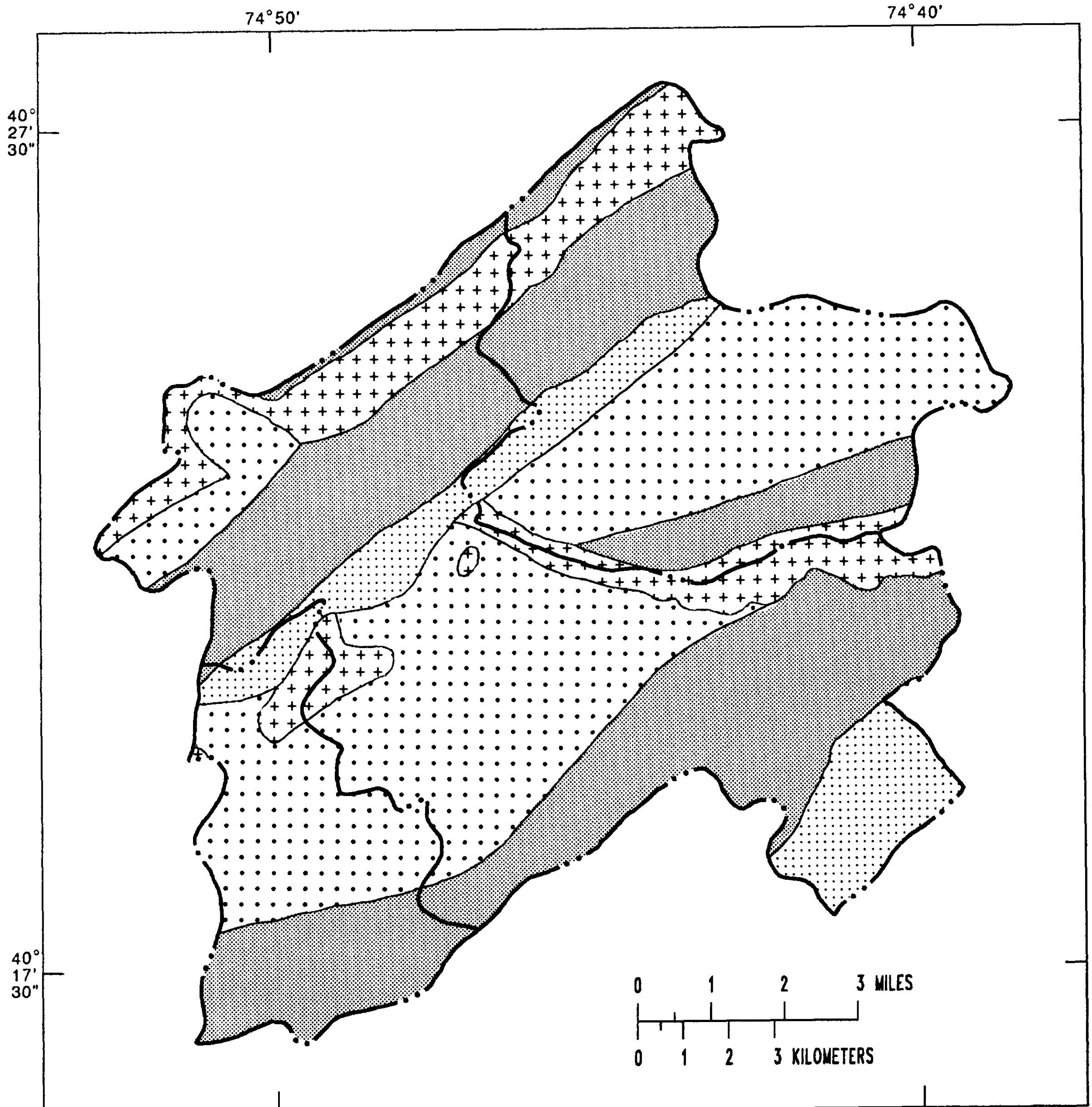
In Mercer County, the Stockton Formation consists of red and gray arkosic sandstone interbedded with shales. Hard, massive, black and bluish argillite characterize the Lockatong Formation. The Passaic Formation consists mainly of soft red shale with some sandstone and siltstone members. The Passaic Formation, the thickest of the three formations, is estimated to be 6,000 ft thick near the Delaware River (Vecchioli and Palmer, 1962, p. 34).

Hydrogoeology

Ground water in the rocks of the Newark Supergroup mainly is stored in and moves through interconnected fractures and joints. Because of compaction and cementation of the formations primary porosity is negligible. Unfractured rock has both low porosity and low permeability and, therefore, little capacity to store or transmit water.

Movement of ground water under natural conditions is anisotropic because of the linear nature of secondary openings in the rock. In the Passaic Formation at a site near Trenton, New Jersey, Vecchioli and others (1969) observed that ground water under pumping conditions moved preferentially along strike. Drawdowns in observation wells situated along strike in relation to a pumped well were up to 10 times greater than those in wells situated transverse to strike.

The water-bearing openings in the rocks are estimated to be present only to depths less than 500 ft below land surface. Drilling beyond this depth usually does not increase well productivity. Well productivity depends primarily on the interception of water-bearing zones by the borehole. Neighboring wells of similar depth and diameter in the same formation can have substantially different well yields.



Base from U.S. Geological Survey, 1:24,000 quadrangles.
Stockton, 1954; Lambertville, 1942; Hopewell, 1942;
Pennington, 1954; Princeton, 1954; Rocky Hill, 1942

Geology modified form
Lyttle and Epstein, 1987

EXPLANATION

Diabase (Lower Jurassic)

Passaic Formation of the Brunswick Group in New Jersey (Lower Jurassic and Upper Triassic)

Lockatong Formation (Upper Triassic)

Stockton formation (Upper Triassic)

Drainage basin boundarys

Figure 3.--Generalized bedrock geology and boundaries of the Jacobs Creek, Stony Brook, and Beden Brook drainage basins.

METHODS OF INVESTIGATION

Ground Water

Water Levels

Water levels were measured continuously at four observation wells from December 1986 through December 1988. The four wells were established at sites estimated to be minimally affected by ground-water withdrawals, with at least one well each in the Jacobs Creek, Stony Brook, and Beden Brook drainage basins. Water levels were recorded hourly at each observation well.

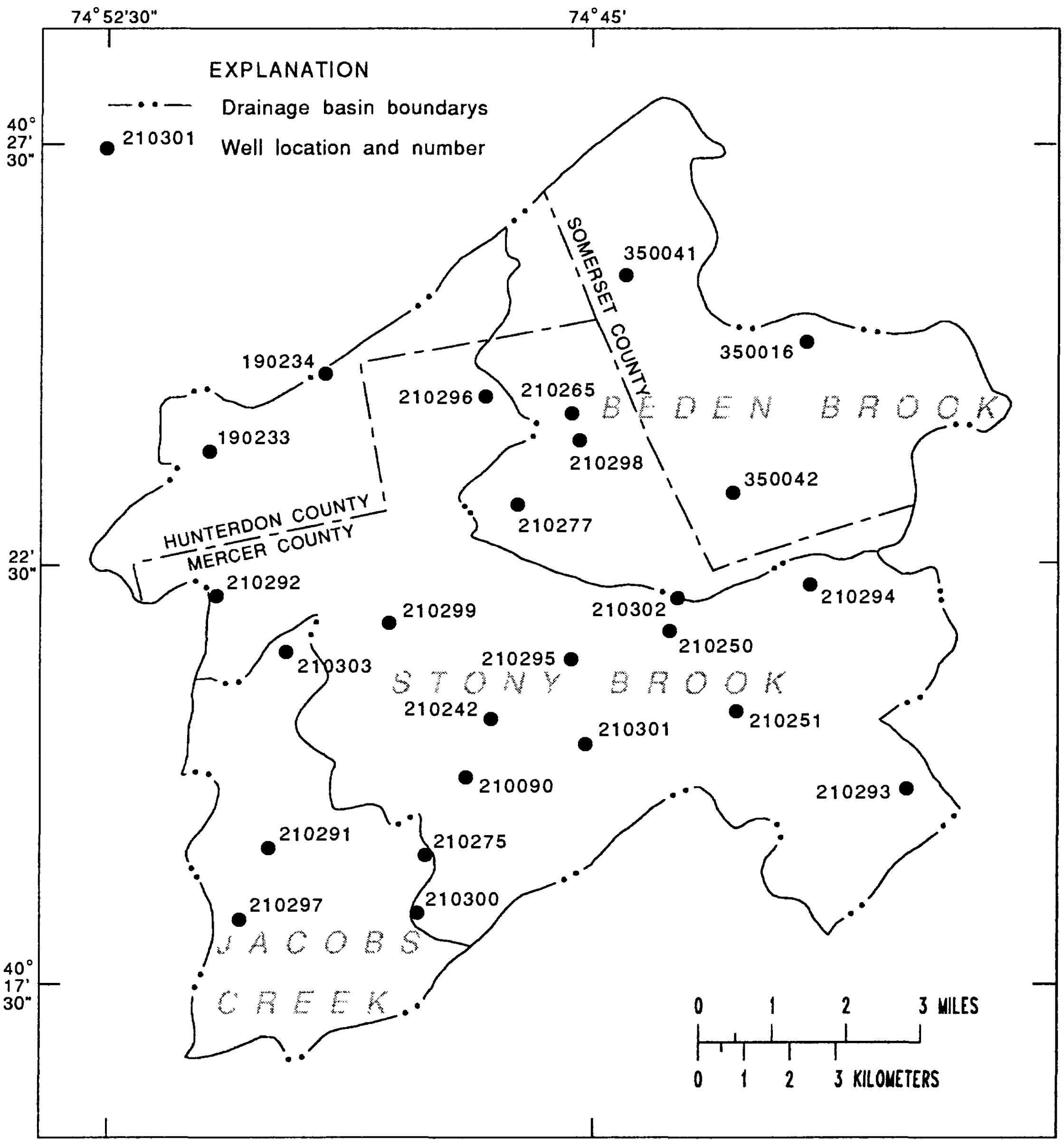
Water levels were measured synoptically in 74 wells in October 1987. Wells were chosen for the synoptic study with a preference for average depths, maximum specific capacities, and locations that maximized areal coverage. Only those wells for which New Jersey State well records are available were considered. Water levels were measured with portable electric tapes. Top of casing elevations of synoptically measured wells were measured with an altimeter. All land-surface and water-level altitudes are reported in ft above sea level.

The water-level map shown on plate 1 was prepared from (1) water levels measured in the 74 wells in October 1987 and (2) stream-surface elevations derived from topographic contours on USGS 7.5-minute series topographic quadrangle maps. (The water level measured in well 210317 was not used to prepare the water-level map because the water level had not stabilized when the measurement was made and, therefore, is not representative of the actual water-level surface at that location.) Results of two low-flow runs (series of surface-water-discharge measurements made at several points along a stream after a period of little or no precipitation) indicate that all or most of the streams in the study area are gaining streams (see p. 20); therefore, all water-level contours on plate 1 were drawn to reflect this.

Water Quality

In order to characterize the natural variability of ground-water chemistry in the study area, a grid of 25 equal-area boxes was drawn on a map of the study area, and one well in each box was selected for water-quality sampling. This method provided adequate areal distribution and adequate representation of all of the major geologic units in the study area (fig. 4). Only those wells for which State well records were available were considered for sampling to ensure that information concerning construction and well depth could be used in the site-selection process.

The changes in pressure and temperature associated with the process of withdrawing water from an aquifer can alter the chemistry of the sample. The greater these changes are, the less representative of the aquifer water the sample is. Proper sampling and preservation techniques helped to stabilize the sample and minimize any changes caused by withdrawal.



Base from U.S. Geological Survey, 1:24,000 quadrangles.
Stockton, 1954; Lambertville, 1942; Hopewell, 1942;
Pennington, 1954; Princeton, 1954; Rocky Hill, 1942

Figure 4.--Locations of ground-water-quality sampling sites in the Jacobs Creek, Stony Brook, and Beden Brook drainage basins.

One ground-water sample was collected from each of 25 wells in the study area from March 21, 1988, through May 6, 1988. Two additional samples were replicates collected for quality-assurance purposes. All ground-water samples were collected according to the guidelines of Claassen (1982), Wood (1976), and Hardy and others (1989). Samples were collected as close to the well head as possible, usually before the water entered holding tanks and always before water entered water softeners. Samples were collected from a few domestic wells after the water had passed through pressure tanks. Except for one well (well 350016), all wells sampled were recently pumped or were pumped daily. All the wells were pumped just prior to sample collection, and the water at the site was monitored for dissolved-oxygen concentration, specific conductance, pH, and temperature. These variables were allowed to stabilize before a sample was collected for further analyses at the U.S. Geological Survey National Water-Quality Laboratory in Arvada, Colorado. Samples were treated immediately after collection according to laboratory requirements (Skougstad and others, 1979). All ground-water samples were analyzed for major dissolved ions, nutrients, trace elements, phenols, and volatile organic compounds at Arvada.

Surface Water

Discharge

Discharge was measured continuously at the USGS streamflow-gaging station at Stony Brook at Princeton (site 01401000), and low-flow runs (series of surface-water discharge measurements made at several points along a stream after a period of little or no precipitation) were conducted in August and November 1987 to measure discharge and determine runoff at sites in the Stony Brook, Jacobs Creek, and Beden Brook drainage basins. (These sites are shown in figure 5 and listed in table 1.) Runoff--in this report, the discharge flowing from each square mile of area drained--is calculated by dividing the discharge at the site by the drainage area. If uniform distribution of precipitation is assumed, comparisons of relative amounts of runoff can be made between sites. The ground-water contribution to runoff generally increases downstream as the stream erodes deeper into the aquifer. For each low-flow run, discharge at each of 63 sites was measured at some time during a 2-day period. These sites were selected to obtain adequate areal coverage within the three basins. Fifty-five of the sites were previously established stream-gaging sites; eight new sites were added to improve coverage. Standard USGS stream-gaging techniques and equipment were used according to the guidelines in Rantz and others (1982).

Water Chemistry

Surface-water chemistry was measured at two types of sites--monitoring and low-flow. In each basin, one site was selected on the main stem at a downstream point near the study-area boundary. This site was called a "monitoring" site. The selection criteria were (1) no backflow from the surface-water body into which the stream emptied, and (2) channel geometry acceptable for stream-discharge measurements (a straight channel and a transverse section with even depth and velocity of water are ideal conditions for a gaging site). Samples were collected and discharge was measured at each site bimonthly from April 1987 through April 1988.

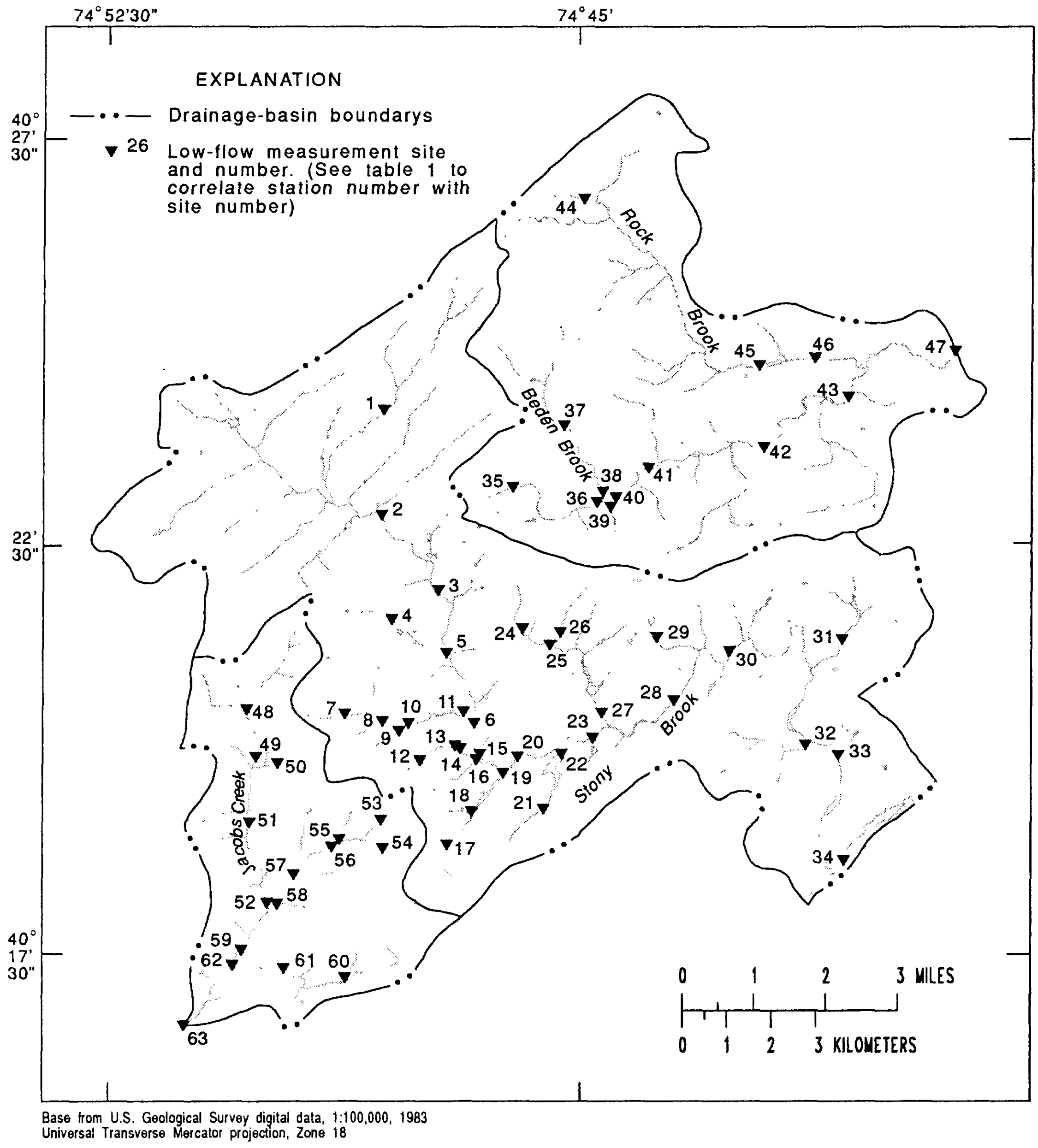


Figure 5.--Locations of low-flow stream-gaging sites in the Jacobs Creek, Stony Brook, and Beden Brook drainage basins.

Table 1.--Station numbers corresponding to site numbers shown on figure 5

Site number	Station number	Site number	Station number
1	01400870	33	01401000
2	01400880	34	01401100
3	01400900	35	01401510
4	01400907	36	01401513
5	01400910	37	01401515
6	01400920	38	01401517
7	01400923	39	01401518
8	01400925	40	01401520
9	01400927	41	01401525
10	01400930	42	01401530
11	01400932	43	01401535
12	01400936	44	01401540
13	01400938	45	01401590
14	01400939	46	01401595
15	01400940	47	01401600
16	01400941	48	01462730
17	01400942	49	01462733
18	01400944	50	01462734
19	01400945	51	01462737
20	01400947	52	01462740
21	01400950	53	01462742
22	01400951	54	01462744
23	01400952	55	01462745
24	01400953	56	01462747
25	01400960	57	01462750
26	01400962	58	01462755
27	01400970	59	01462760
28	01400974	60	01462765
29	01400978	61	01462770
30	01400985	62	01462775
31	01400990	63	01462800
32	01400998		

Two of the 3 monitoring sites and 10 additional sites suitable for sampling were selected as "low-flow" sites. Of these 12 sites, 6 were on Stony Brook, 3 were on Jacobs Creek, and 3 were on Beden Brook (fig. 6). The selection criteria were (1) comprehensive areal coverage, and (2) channel geometry acceptable for stream-discharge measurements.

All surface-water samples were collected by use of standard USGS procedures (Skougstad and others, 1979). Stream discharge was measured at the time of sample collection. Chemical analyses were done by the USGS National Water-Quality laboratory in Arvada, Colorado. Organic constituents were determined with the procedures outlined in Goerlitz and Brown (1972), and inorganic constituents were measured with those outlined in Skougstad and others (1979). One replicate low-flow sample was collected at site 01401596 on Rock Brook for quality assurance. All surface-water samples were analyzed for major ions, nutrients, trace elements, phenols, and dissolved and suspended organic carbon.

Trace Elements and Organic Compounds in Bottom Sediments

In most streams, concentrations of trace elements are much greater in suspended and bottom sediments than in the water column (Horowitz, 1985, p. 1). Bottom and suspended sediments are the chief mode of transport, distribution, and availability of trace elements and can be a reservoir for them; therefore, an undisturbed bottom-sediment sink can act as a historical record of changes in the stream through time (Horowitz, 1985, p. 2).

Bottom sediments also can be a repository for many nonionic organic compounds, such as pesticides, polychlorinated biphenyls (PCB's), various solvents and lubricants, and other manmade chemical products. Because of their high insolubility in water, there is strong evidence that these compounds attach to sediments by dissolving into sediment organic matter (Chiou and others, 1979).

Collection of bottom samples was limited to the main stems of the streams because of the greater availability of sediments there than on the tributaries. Two sites on Jacobs Creek, five on Stony Brook, and four on Beden Brook were selected (fig. 6), primarily to maximize areal coverage. In a few cases, sites were located downstream from road crossings and sewage-treatment plants to ensure that any possible contribution of trace elements or organic compounds from these sources would be represented. Insufficient sediment quantity necessitated moving some sampling sites upstream or downstream until suitable conditions were found.

Samples were collected for trace elements and organic compounds during fair weather from August 1987 to November 1987. The sampling of streambeds consisted of removing a cross-section of sediments from the upper 2 in. of the bed. In order to normalize the trace-element data, only the fraction less than 63 micrometers in size was analyzed. Sediments sampled for analysis for trace elements were collected with plastic implements, placed in a 63-micrometer polyvinyl chloride (PVC) sieve, and flushed with river water. After sieving, the 63-micrometer-and-greater fraction was discarded, and the remaining sample was placed in large jars and allowed to settle before being decanted and shipped for analysis. Sediments sampled for determination of organic compounds were collected in bulk form with metal

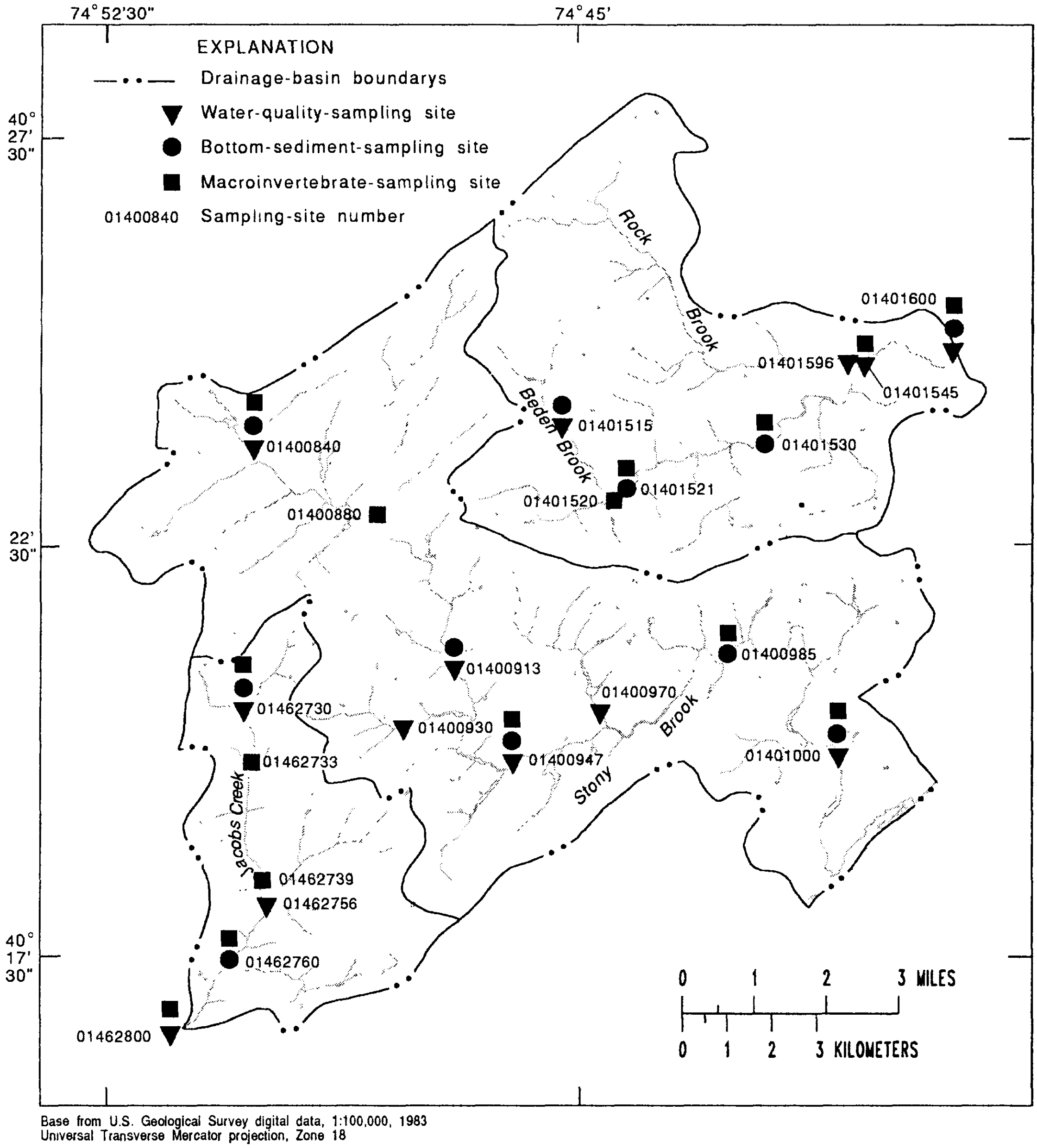


Figure 6.--Locations of stream-sampling sites in the Jacobs Creek, Stony Brook, and Beden Brook drainage basins.

implements and were refrigerated prior to analysis. Analyses for trace elements were done by total digestion at the USGS Geologic Division laboratory in Lakewood, Colorado, as outlined in Baedecker (1987). Analyses for organic compounds were done at the USGS National Water Quality Laboratory in Arvada, Colorado, as outlined in Skougstad and others (1979).

Benthic Macroinvertebrates

Many communities of plants and animals exist within freshwater streams and are integral parts of the stream ecosystem. The stream that is free of any stresses contains biological assemblages and a diversity of species that reflect natural and balanced conditions. Commonly, the most useful assessment of water-quality conditions and changes can be made with biological data (Slack and others, 1973, p. 7). The introduction of contaminants to a stream is a stress on the system that can affect the biota in a variety of complex ways. Reactions of the biota, such as fluctuations in diversity of species and population density, can be measured. These data reflect changes in water quality through time, whereas chemical data typically represent instantaneous conditions. In addition to water chemistry, these populations are affected by variations in the natural stream substrates and in sunlight. Therefore, differences in substrates and sunlight among sites ideally should be minimized during site selection.

Macroinvertebrates in Stony Brook, Jacobs Creek, and Beden Brook were sampled by the New Jersey Department of Environmental Protection and Energy (NJDEPE) in 1987. Five sites along the main stem of each stream were chosen to provide adequate areal coverage (fig. 6). Sites were established at riffle zones in order to minimize differences caused by habitat variations. Samples were collected at each site during spring, summer, and fall. All field collections were performed by NJDEPE personnel in accordance with the procedures outlined in N.J. Department of Environmental Protection (1987). A Surber[2] sampling device was used with a 1-ft^2 target area and 0.595-millimeter mesh. A cross-section of three samples was collected from the water at each site. NJDEPE personnel identified all sampled organisms. Results of these analyses are given in table 11.

GROUND WATER

Water Levels

Changes in the ground-water level in a properly constructed well reflect changes in the water table or the potentiometric surface of an aquifer. Water-level hydrographs can show seasonal variations in the water table caused by changes in recharge and evapotranspiration, and the effects of nearby ground-water withdrawals.

---

[2] The use of brand names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

Hydrographs of daily mean water levels from the four observation wells in the Passaic Formation within the study area are shown in figure 7. In 1987 and 1988, all four hydrographs showed decreasing water levels from spring to summer and increasing water levels in fall and winter. Recharge to most ground-water systems occurs in late fall, winter, and early spring, when plants are dormant and transpiration is minimal. The sharp drops seen in the water levels of the Honey Branch well probably are the result of withdrawals from a nearby irrigation well that normally is used from April through October. The lowest recorded water levels not caused by withdrawals were recorded in 1988.

Plate 1 shows the locations of the four observation wells and the wells measured during the October 1987 ground-water-level synoptic study. Results of the synoptic study indicate that, in general, the ground-water-level contours mimic the topographic contours, and the ground-water and surface-water drainage divides coincide. Low water-level altitudes are associated with low land-surface altitudes, and high water-level altitudes are associated with high land-surface altitudes. A water-level elevation of 90 ft measured in well 210348, however, suggests the possibility of local ground-water flow between the Stony Brook and Jacobs Creek drainage basins and indicates that surface-water and ground-water drainage divides may not coincide in this area. Measured water-level altitudes ranged from 49 ft to 450 ft above sea level; land-surface elevations in the study area range from 40 ft to 552 ft above sea level. Depth to water below land surface ranged from 0 ft to 99 ft. Water levels were less than 40 ft below land surface in most wells. Locations of, and hydrogeologic data for, wells used in the synoptic study are listed in table 2 (at end of report).

Water Quality

Locations of, and hydrogeologic data for, sampled wells are listed in table 2 (at end of report). Results of chemical analyses of ground-water samples are shown in table 3 (at end of report).

Inorganic Constituents

Ground-water samples were collected from 25 wells in the study area from March 21, 1988, through May 6, 1988. Temperatures ranged from 11.5 to 13.5 °C and specific conductance ranged from 120 to 590 μS/cm (microsiemens per centimeter at 25 °C). Dissolved-oxygen concentrations ranged from 0.2 to 9.3 mg/L (milligrams per liter) and pH ranged from 6.04 to 8.83.

Major cationic and anionic compositions of water from 24 of the 25 wells sampled are displayed in figure 8. (Major anion and cation data are unavailable for well 210277.) Figure 8A shows data from wells located in the Passaic Formation and figure 8B shows information from wells located in the Stockton Formation, the Lockatong Formation, and the diabase dikes.

In the Passaic Formation, calcium is proportionately the most abundant cation, and bicarbonate is the most abundant anion. This is also true for all of the samples from the Stockton Formation, Lockatong Formation, and the diabase dikes, with two exceptions: In samples from well 190234 in the

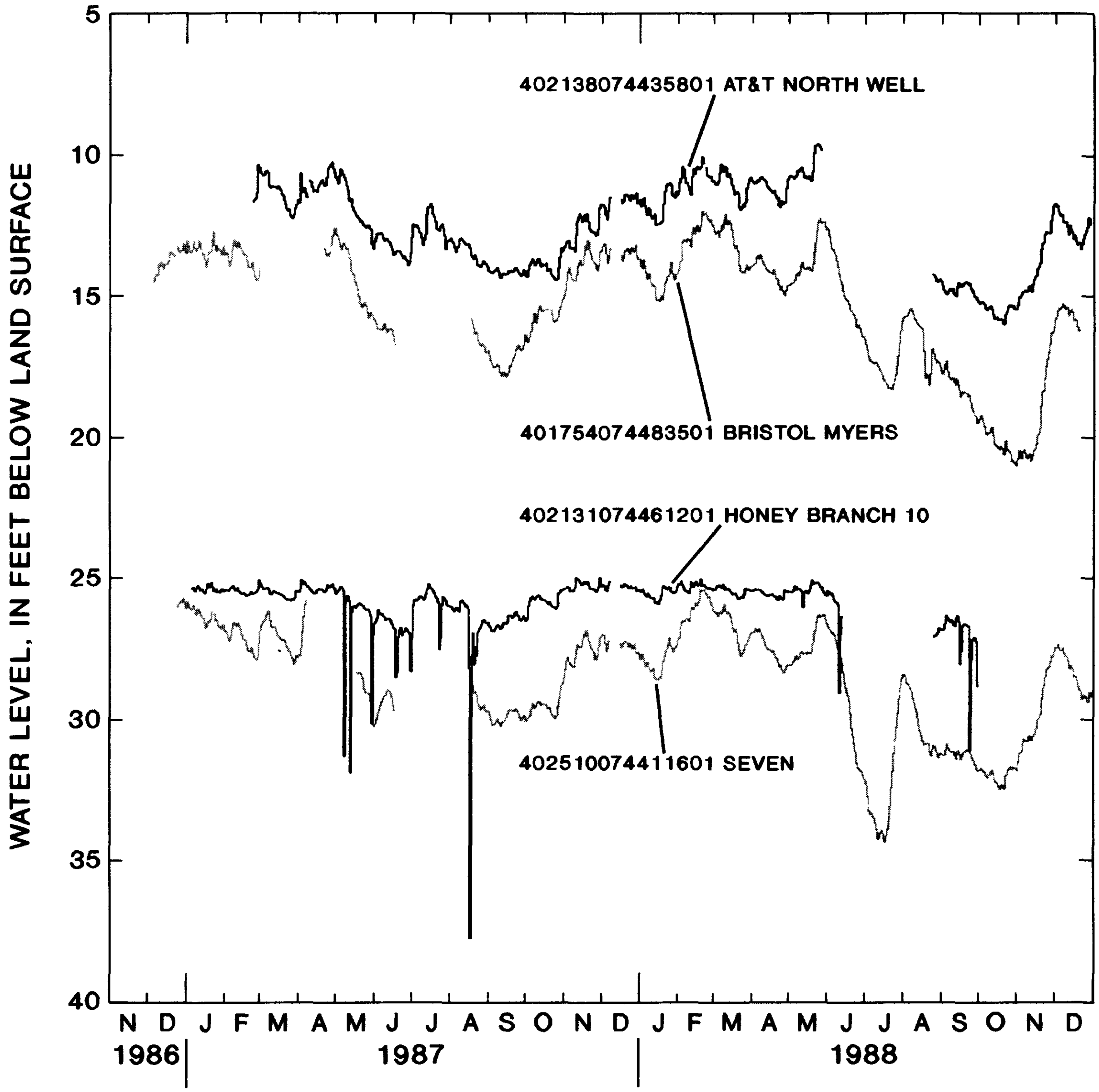


Figure 7.--Hydrographs of water levels in observation wells in the Passaic Formation.

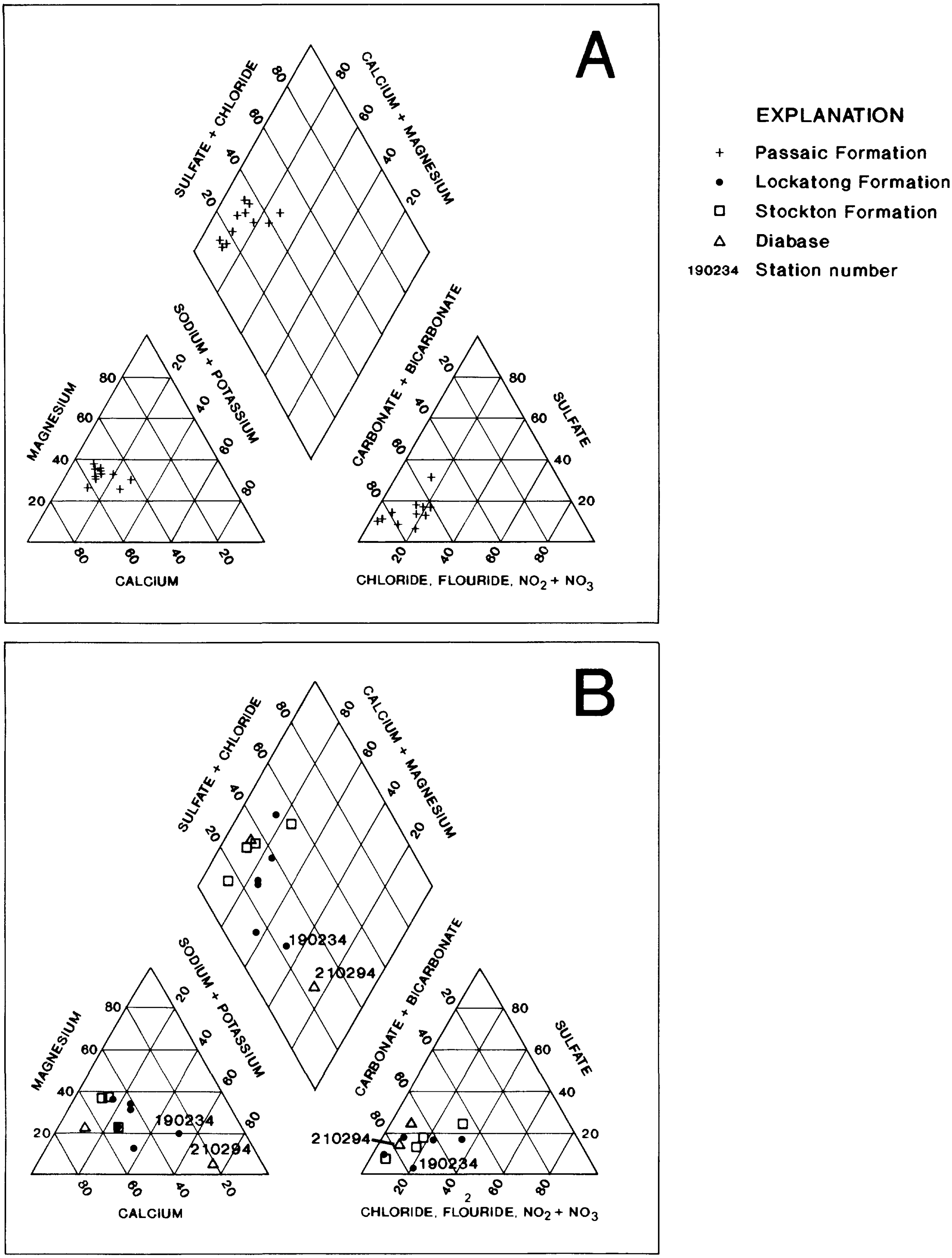


Figure 8.--Percentage distribution of major cations and anions in ground-water samples from wells in the: (**A**) Passaic Formation, and (**B**) Stockton and Lockatong Formations and diabase dikes.

Lockatong and 210294 in the diabase, sodium is the most abundant cation. In general, ionic compositions of water from the Passaic Formation exhibited the least variability, whereas those of samples from the other formations were most variable.

Concentrations of all trace elements determined in ground-water samples were below primary drinking-water regulations of the U.S. Environmental Protection Agency (USEPA), (1988a). The USEPA nonenforceable secondary drinking-water regulation for iron, 300 μg/L (micrograms per liter), was exceeded in water from well 210292, and the nonenforceable secondary drinking-water regulation for manganese, 50 μg/L, was exceeded in wells 210292, 210296, 210299, 210303 and 350041 (U.S. Environmental Protection Agency, 1988c). Most trace elements for which no drinking-water regulations are available were present at low concentrations and varied little. Two exceptions were concentrations of boron, which ranged from the detection limit (10 μg/L) to 1,100 μg/L, and of strontium, which ranged from 5 to 2,900 μg/L.

Nitrogen

Sources of nitrates and other forms of nitrogen in ground water are largely anthropogenic, and include agricultural fertilizers and septic-system effluent. The USEPA maximum contaminant level for nitrate (as nitrogen) is 10 mg/L (U.S. Environmental Protection Agency, 1988a).

All ground-water samples were analyzed for nitrite, nitrite plus nitrate, ammonia, and ammonia plus organic nitrogen. Concentrations of ammonia plus organic nitrogen, measured together as nitrogen, ranged from the detection limit of 0.2 mg/L to 0.4 mg/L. Concentrations of nitrite plus nitrate as nitrogen ranged from the detection limit of 0.1 mg/L to 4.7 mg/L. Concentrations of nitrate as nitrogen in all ground-water samples were less than the USEPA maximum contaminant level.

Organic Constituents

Water samples from the 25 ground-water wells in the sampling program were analyzed for dissolved organic carbon (DOC), and samples from 23 of the wells also were analyzed for 36 volatile organic compounds (VOC's). Concentrations of dissolved organic carbon ranged from 0.1 mg/L to 1.0 mg/L. Ground water typically contains DOC in concentrations less than 2.0 mg/L (Thurman, 1985, p. 14). The sample from well 210277 contained 12 μg/L tetrachloroethylene; the New Jersey primary drinking-water regulation for this compound is 1.0 μg/L (New Jersey Register, 1989). All other samples contained VOC's in concentrations below the detection limit of 3 μg/L. New Jersey primary drinking-water regulations for the following compounds determined in this study are less than 3 μg/L: benzene, carbon tetrachloride, 1,2-dichloroethane, 1,1-dichloroethylene, methylene chloride, trichloroethylene, and vinyl chloride (New Jersey Register, 1989).

SURFACE WATER

Discharge

The daily mean discharge of Stony Brook at Princeton from October 1986 through September 1988 showed no extremes compared to the long-term record that began in October 1953 (fig. 9). The highest flows during the 2-year period, in excess of 1,000 ft^3/s (cubic feet per second), were measured during the 1987 water year; the lowest flows were measured during the 1988 water year. Total precipitation measured at New Brunswick was higher in water year 1987 than in water year 1988.

Table 4 (at end of report) shows low-flow discharge values and drainage areas for the surface-water-measurement sites on the three streams studied. The highest runoff at a main-stem site was 0.89 $(ft^3/s)/mi^2$ (cubic feet per second per square mile), measured at site 01462733 on Jacobs Creek in November 1987. Average runoff values for main-stem sites in August 1987 were 0.30 $(ft^3/s)/mi^2$ for Jacobs Creek, 0.25 $(ft^3/s)/mi^2$ for Beden Brook, and 0.18 $(ft^3/s)/mi^2$ for Stony Brook. Average runoff values for main-stem sites in November 1987 were 0.70 $(ft^3/s)/mi^2$ for Jacobs Creek, 0.60 $(ft^3/s)/mi^2$ for Beden Brook, and 0.59 $(ft^3/s)/mi^2$ for Stony Brook. In both August and November, average runoff was highest at Jacobs Creek and lowest at Stony Brook. Generally, both runoff and discharge increased downstream for Jacobs Creek, Stony Brook, and Beden Brook. The exceptions in which the discharge decreased downstream could be the result of measurement error (R.D. Schopp, U.S. Geological Survey, oral commun., 1991). Locations and streamflow-measurement periods of record for surface-water sites are shown in table 5 (at end of report).

Flow-Duration Curves of Stony Brook

The flow-duration curve is a cumulative frequency curve that shows the percentage of time specific discharges were equaled or exceeded during a given period of time (Searcy, 1959, p. 1).

Four flow-duration curves of mean daily discharge measured at the USGS gaging station at Stony Brook at Princeton (station 01401000) are shown in figure 10. The 1954-88 curve represents the total period of record for the gaging station; the 1987-88 curve represents the study period. The 1973 and 1966 curves represent the wettest and driest years, respectivly.

The flow-duration curves show that the mean daily discharges for Stony Brook during the study period fall between the curves for the period of record and the wettest year. This indicates that the study period, although somewhat wetter than normal for Stony Brook, was not extreme. Given the proximity and similar geology of the three basins, hydrologic conditions at Jacobs Creek and Beden Brook probably were similar to those at Stony Brook.

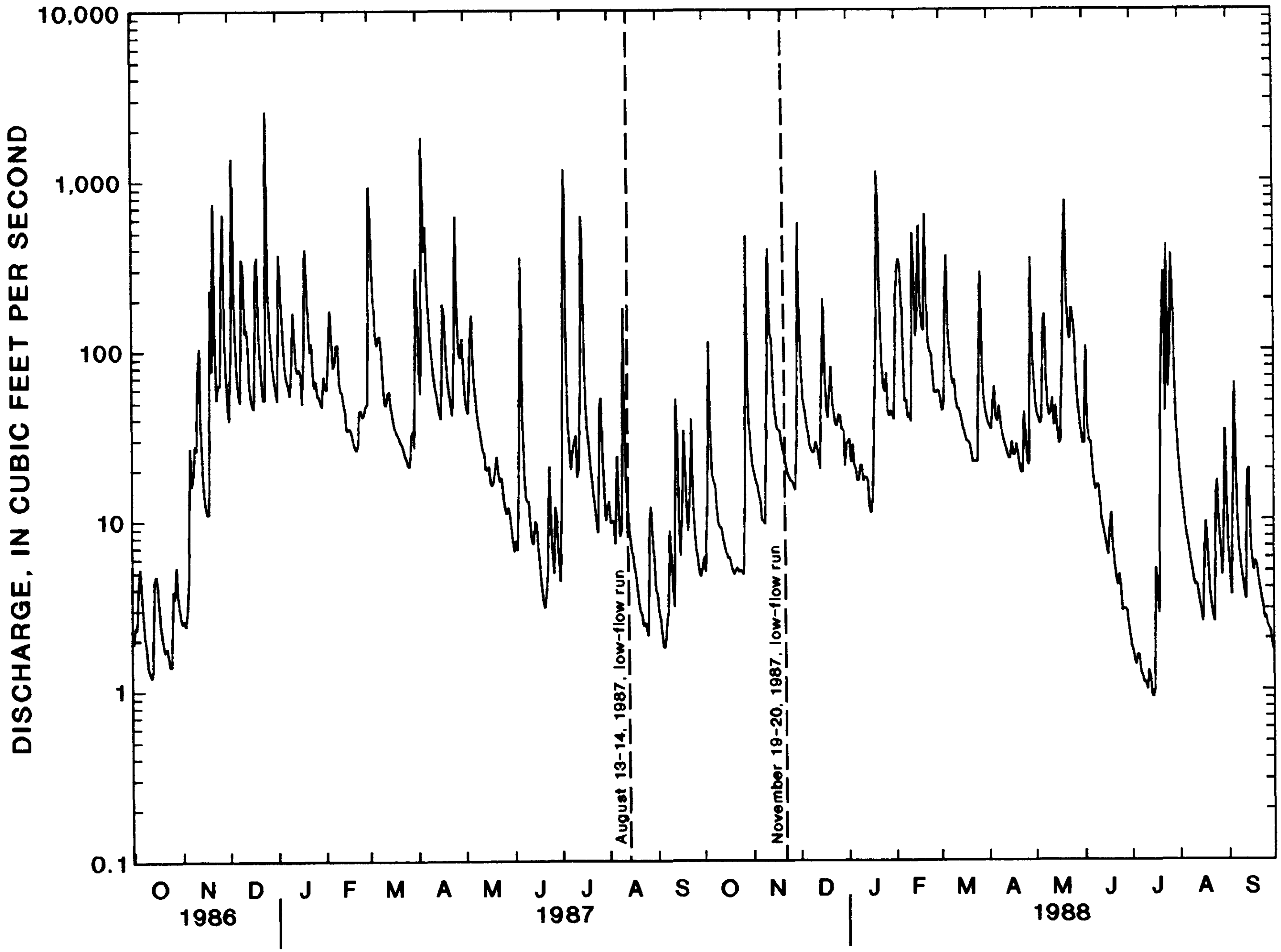


Figure 9.--Daily mean discharge of Stony Brook at Princeton, N.J. (station 01401000).

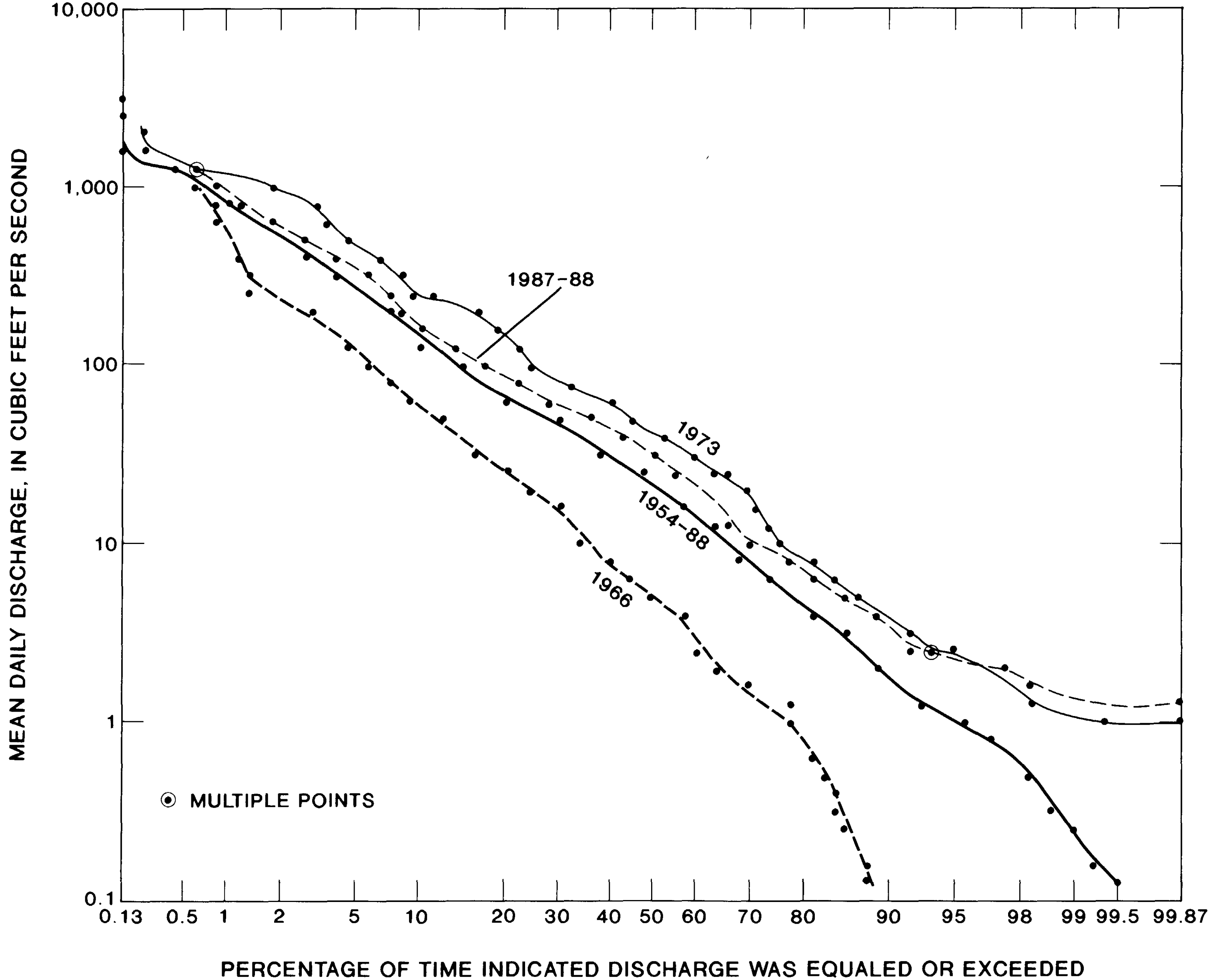


Figure 10.--Flow-duration curves of mean daily discharge at Stony Brook at Princeton, N.J. (station 01401000).

Water Quality

Jacobs Creek

Major ions and field measurements

The compositions of the monitoring and low-flow samples collected at surface-water sampling sites on Jacobs Creek with respect to major cations and anions are displayed in figure 11. Calcium and sodium plus potassium were the dominant or codominant cations in all of the samples; bicarbonate and chloride were the dominant or codominant anions. Chloride was the dominant anion in the monitoring sample collected on February 5, 1988 (point number 6 on the Piper diagram). Chloride also was the dominant anion in the monitoring samples collected in February 1988 from Stony Brook and Beden Brook, possibly as a result of winter road salting.

Field measurements of temperature, specific conductance, dissolved oxygen, and pH were made prior to all sampling at monitoring and low-flow sites. Temperatures ranged from 2.5 to 28 °C, and specific conductance ranged from 182 to 292 μS/cm. Dissolved-oxygen concentrations ranged from 8.0 to 14.0 mg/L, and pH ranged from 7.3 to 9.58. Results of chemical analyses of surface-water samples collected at the monitoring sites are shown in table 6, and results of analyses of samples from the low-flow sites are shown in table 7 (both at end of report).

Nitrogen and phosphorus

Nitrogen and phosphorus are nutrients that can cause undesirable aquatic plant growth (eutrophication) in lakes and streams. Eutrophication occurs when dissolved inorganic nitrogen is present in concentrations greater than 0.3 mg/L and (or) total dissolved phosphorus is present in concentrations greater than 0.1 mg/L (Mackenthun, 1969, p. 41 and 156).

Concentrations of dissolved nitrogen and dissolved phosphorus in surface-water samples from Jacobs Creek are shown in figure 12. Dissolved inorganic-nitrogen concentrations equal to or greater than 0.3 mg/L were present in the water samples from low-flow sites 01462730 and 01462800, and in all samples from the monitoring sites except that collected on June 2, 1987. Concentrations of total phosphorus were equal to or greater than 0.1 mg/L in the samples collected from the monitoring sites on June 2, 1987, and August 4, 1987. Concentrations of total phosphorus in all samples from the low-flow sites were less than 0.1 mg/L. The range of concentrations of total nitrogen and total phosphorus in the samples from the low-flow sites were within the range of concentrations in the samples collected from the monitoring sites.

Trace elements in bottom sediments and surface waters

Samples of the bottom sediments and surface water from Jacobs Creek were analyzed for up to 47 trace elements. Results of trace-element analyses of surface-water samples from monitoring site 01462800, low-flow surface-water samples, and bottom-sediment samples are shown in tables 6, 7, and 8, respectively.

EXPLANATION

• SAMPLE FROM MONITORING SITE

SAMPLING DATE	NUMBER ON DIAGRAM
04-02-87	1
06-02-87	2
08-04-87	3
10-09-87	4
12-03-87	5
02-05-88	6
04-06-88	7

▽ LOW-FLOW SAMPLE

STATION NUMBER	LETTER ON DIAGRAM
01462730	A
01462756	B
01462800	C

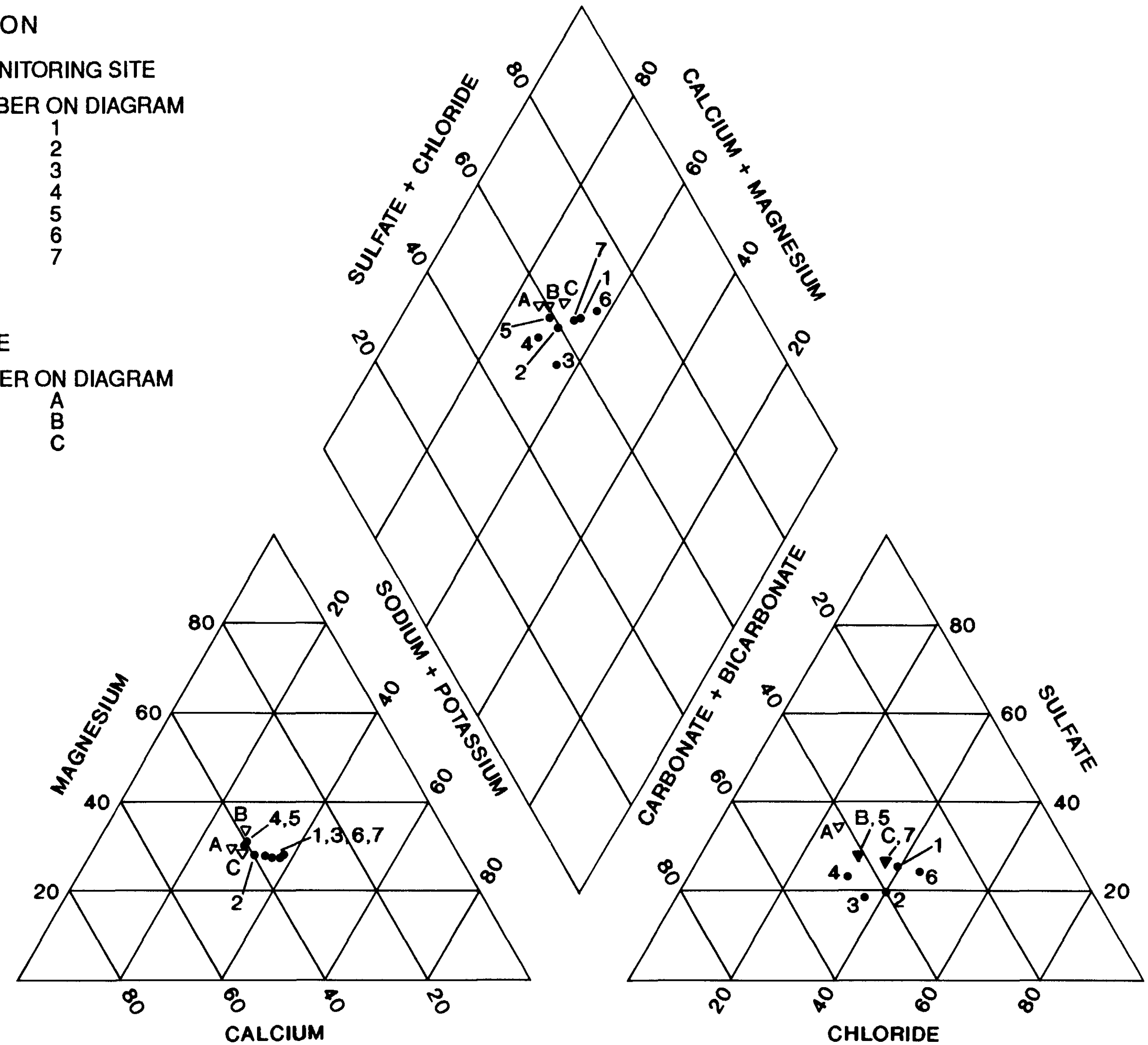


Figure 11.--Percentage distribution of major anions and cations in surface-water samples from Jacobs Creek.

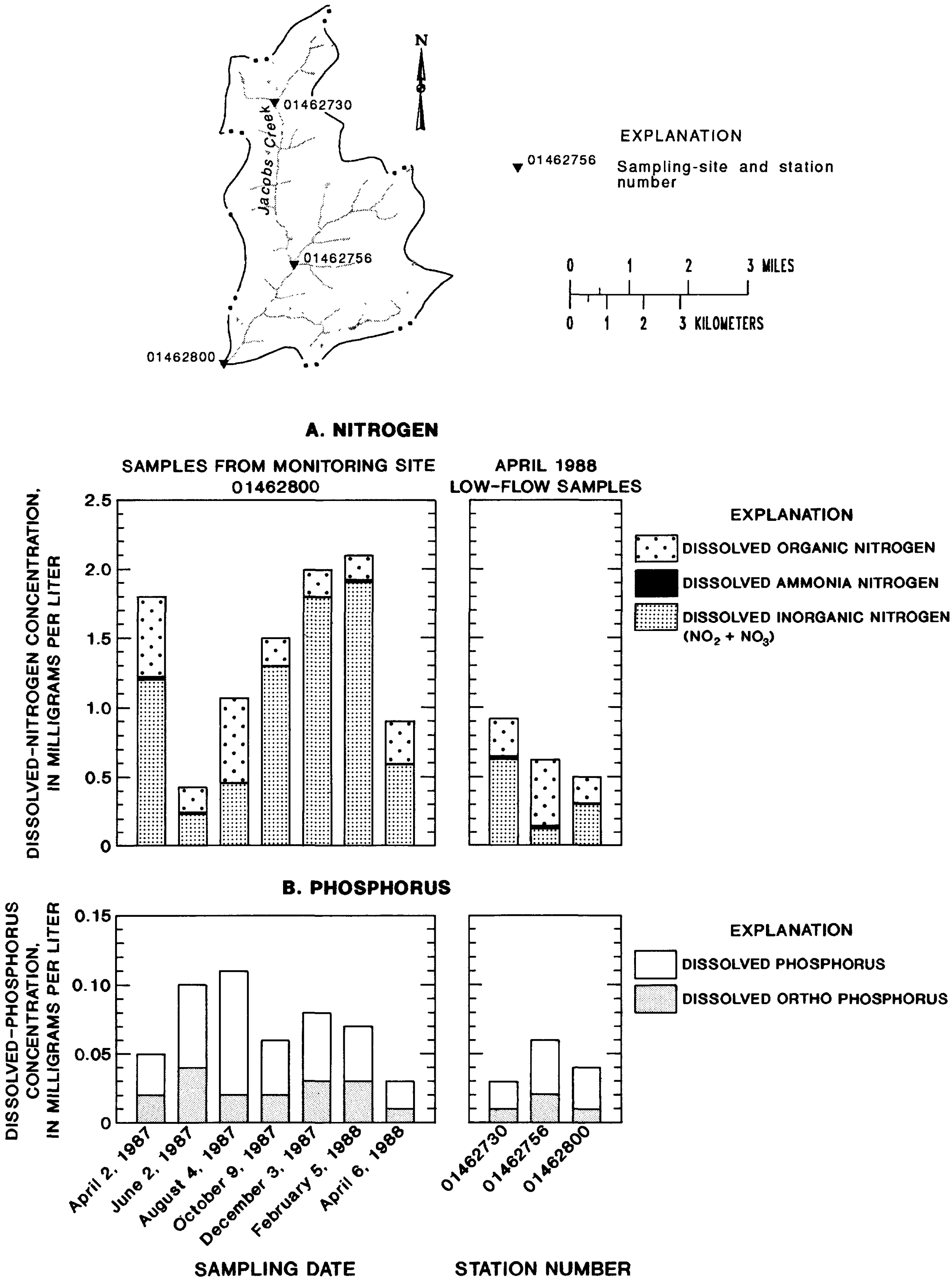


Figure 12.--Concentrations of (A) dissolved nitrogen and (B) dissolved phosphorus in surface-water samples from Jacobs Creek.

Copper, lead, and zinc are 3 of the more common of the 47 trace elements analyzed for in the bottom sediment samples. These elements normally are associated with urban and road runoff. Samples from the two bottom-sediment sites on Jacobs Creek (01462730 and 01462760) contained copper in concentrations that ranged from 34 to 67 mg/L, a significant variation. Concentrations of lead and zinc did not vary significantly, however, and were lower than those found in samples of the bottom sediments from Stony Brook and Beden Brook, possibly because roads in the Jacobs Creek drainage basin are less heavily travelled than those in the other two drainage basins.

Concentrations of the following trace elements in bottom samples were below reporting levels: silver, gold, bismuth, cadmium, holmium, molybdenum, tin, tantalum, and uranium. Concentrations of the other trace elements determined are of minor geochemical importance.

No surface-water samples contained trace elements in concentrations exceeding USEPA primary or secondary drinking-water regulations (U.S. Environmental Protection Agency, 1988a; U.S. Environmental Protection Agency, 1988c).

Concentrations of the following trace elements in low-flow surface-water samples were at or below reporting levels: arsenic, cadmium, chromium, lead, nickel, zinc, selenium, and mercury. The following trace elements were found in concentrations greater than reporting levels: boron (maximum concentration 30 μg/L); copper (maximum concentration 4 μg/L); iron (maximum concentration 25 μg/L); manganese (maximum concentration 24 μg/L); and aluminum (maximum concentration 20 μg/L).

Trace elements found in concentrations at or below reporting levels in surface-water samples from monitoring site 01462800 include arsenic, beryllium, cadmium, lead, selenium, and mercury. The following trace elements were found in concentrations greater than reporting levels: boron (maximum concentration 50 μg/L); chromium (maximum concentration 4 μg/L); copper (maximum conentration 3 μg/L); iron (maximum concentration 51 μg/L); manganese (maximum concentration 10 μg/L); nickel (maximum concentration 5 μg/L); zinc (maximum conentration 10 μg/L); and aluminum (maximum concentration 30 μg/L).

Organic compounds in bottom sediments

Ratios of concentrations of organic compounds to concentration of total organic carbon in bottom sediments in Jacobs Creek are shown in table 9. The data are normalized because organic compounds tend to have an affinity for organic carbon. Normalization permits comparison of relative concentrations of compounds between sites at which variable amounts of sediment organic carbon are present (Smith and others, 1987).

Results of sediment analysis show that two types of persistent organic compounds are present in the sediments of Jacobs Creek--chlorinated insecticides and polycyclic aromatic hydrocarbons. These compounds were present in the sample from site 01462760; the sample from site 01462730 did not contain concentrations of either type of compound greater than the respective laboratory reporting levels (table 10, at end of report).

Table 9.--Ratio of concentrations of organic compounds to concentration of total organic carbon in bottom sediments in Jacobs Creek

[Dashes indicate concentration of compound below laboratory detection limit]

	Ratio x 1,000	
	Site	
Compound	01462730	01462760
Chlordane	---	8.3
DDD	---	1.7
DDE	---	2.1
DDT	---	20
Dieldrin	---	.8
Fluoranthene	---	3,540
Phenanthrene	---	1,500
Pyrene	---	2,670

The chlorinated insecticides found in the samples are dieldrin; 1,1-Bis(4-chlorophenyl)-2,2,2-trichloroethane (DDT); 2,2-Bis(4-chlorophenyl)-1,1-dichloroethylene (DDE); 2,2-Bis(4-chlorophenyl)-1,1-dichloroethane (DDD); and chlordane. The polycyclic aromatic hydrocarbons found are pyrene, fluoranthene, and phenanthrene. Table 10 shows the types of organic compounds determined and the concentrations of those compounds detected.

Former uses and possible sources of these compounds vary. Runoff from local agricultural land could account for the presence of insecticides. Polycyclic aromatic hydrocarbons are used in a variety of products, including dyes, insecticides, fungicides, and explosives (Verschueren, 1983).

Macroinvertebrate diversities and population densities

A statistical summary of the results of biological analyses of stream samples is shown in table 11 (at end of report).

Macroinvertebrate population densities differed significantly among sites 01462730, 01462733, and 01462739 during summer and fall 1987 (fig. 13). Macroinvertebrate samples collected during summer 1987 contained 132.3 mean individuals per square foot (MI/SF), 2,055.3 MI/SF, and 1,154.67 MI/SF at sites 01462730, 01462733, and 01462739, respectively. Macroinvertebrate samples collected during fall 1987 contained 505.3 MI/SF, 806.3 MI/SF, and 1,104 MI/SF at sites 01462730, 01462733, and 01462739, respectively. Population densities in samples collected during spring 1987 did not vary significantly among sites.

Species diversity decreased downstream between sites 01462730 and 01462733, and between sites 01462733 and 01462739, in summer and fall 1987. Increases in macroinvertebrate population densities accompanied by decreases in species diversities suggest an increase in organic loads between these sites. (Organic loads consist of organic matter that typically depletes dissolved oxygen in water as it decomposes. Nutrient enrichment also can be caused by decomposition of organic matter.) Concentrations of dissolved phosphorus and dissolved organic nitrogen increased between sites 01462730 and 01462760 in 1988; these increases can be seen in the results of analyses of the low-flow surface-water samples collected during April 1988 for nitrogen and phosphorus.

Stony Brook

Major ions and field measurements

The compositions of the monitoring and low-flow samples collected at sites on Stony Brook with respect to major cations and anions are displayed in figure 14. Calcium and sodium plus potassium were the dominant or codominant cations in all of the samples. Bicarbonate was the dominant anion in all the samples except that collected from the monitoring site on February 5, 1988; chloride was the dominant anion in that sample (point number 6 on the Piper diagram). This shift in the anion percentages toward chloride, also seen in the February samples from Jacobs Creek and Beden Brook, could be a result of winter road salting.

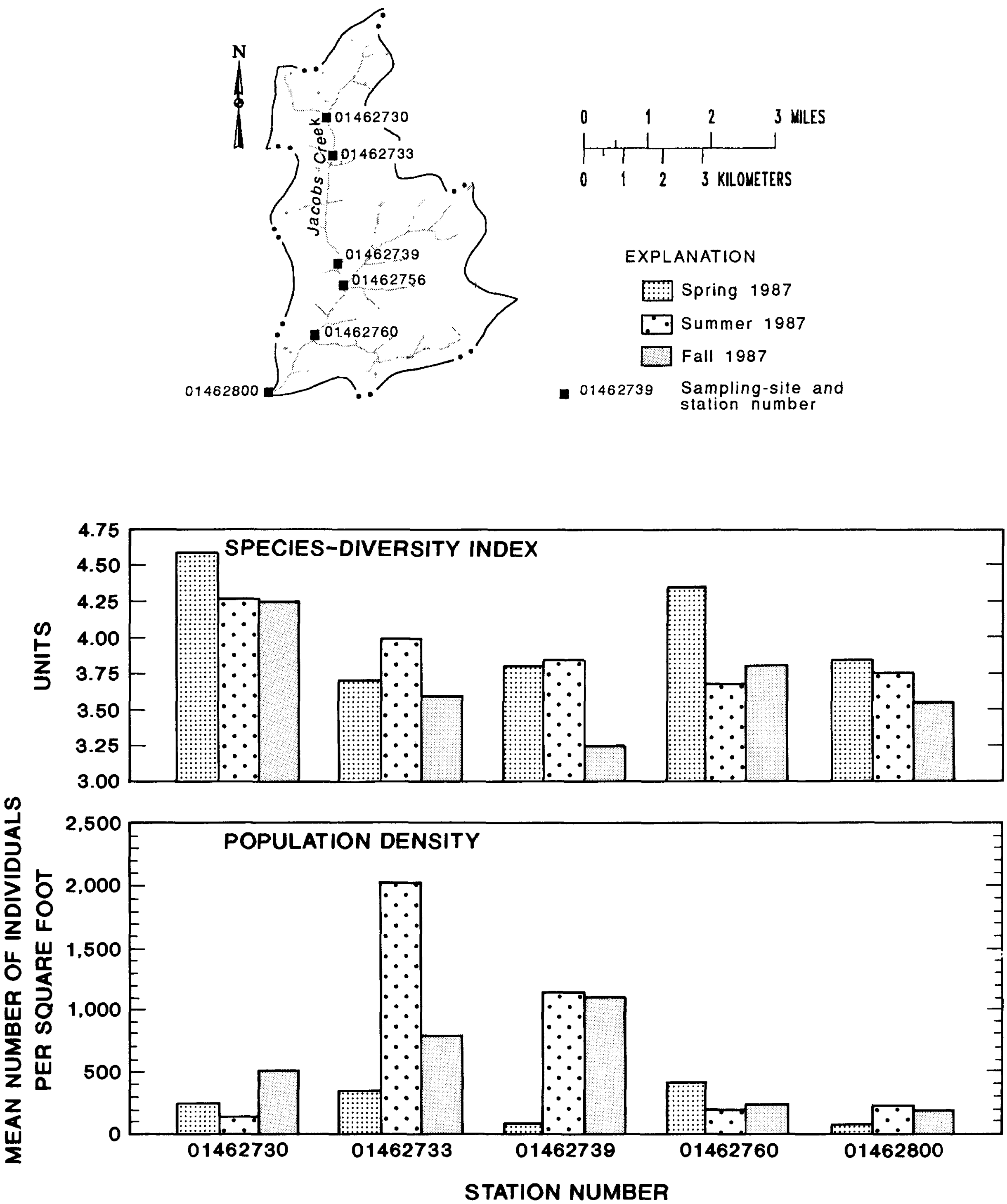


Figure 13.--Macroinvertebrate species diversity and population densities at sampling sites on Jacobs Creek.

EXPLANATION

• SAMPLE FROM MONITORING SITE

SAMPLING DATE	NUMBER ON DIAGRAM
04-02-87	1
06-02-87	2
08-03-87	3
10-09-87	4
12-02-87	5
02-05-88	6
04-06-88	7

▿ LOW-FLOW SAMPLE

STATION NUMBER	LETTER ON DIAGRAM
01400840	A
01400913	B
01400930	C
01400947	D
01400970	E
01401000	F

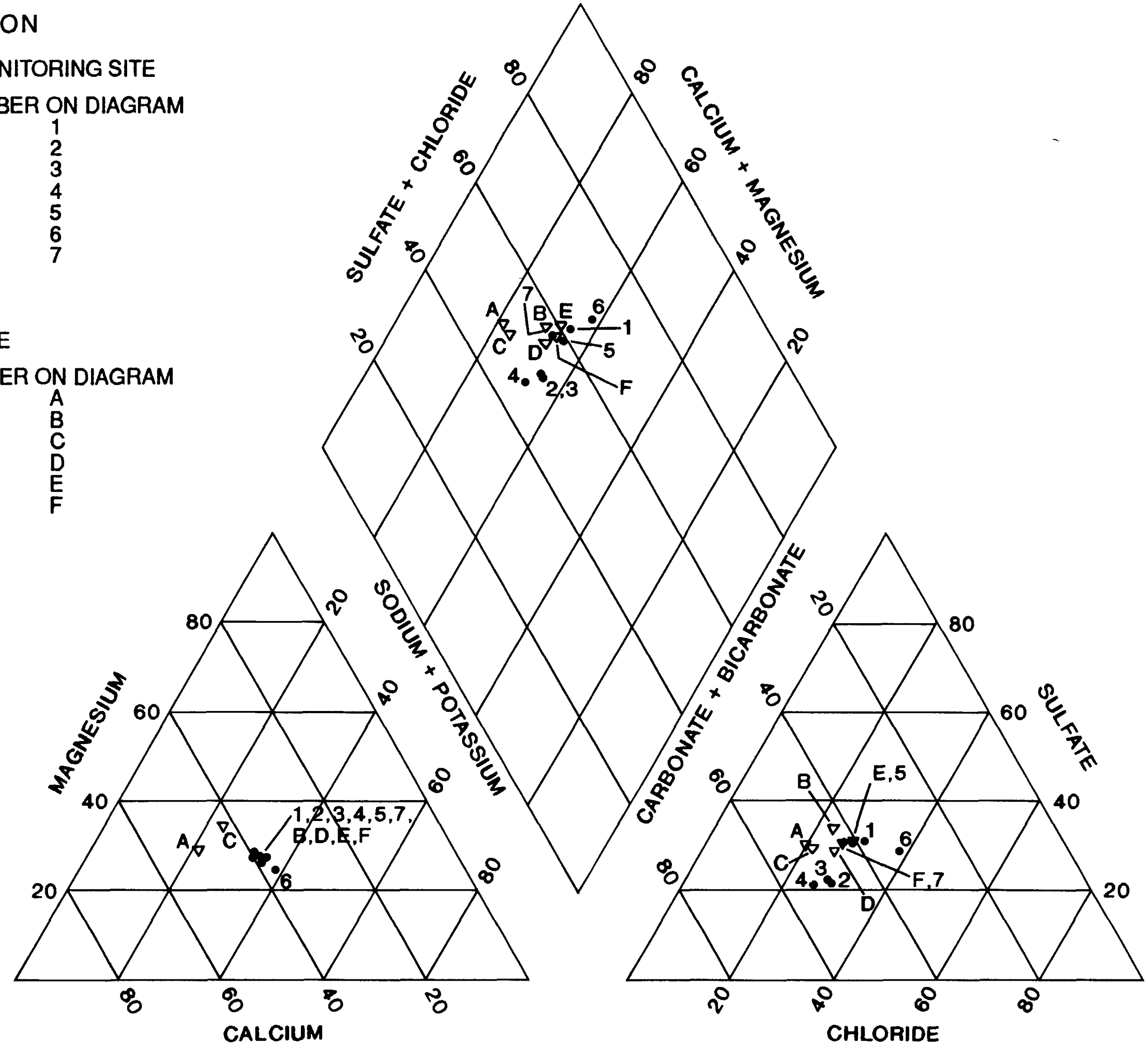


Figure 14.--Percentage distribution of major anions and cations in surface-water samples from Stony Brook.

Field measurements of temperature, specific conductance, dissolved oxygen, and pH were made prior to all sampling at monitoring and low-flow sites. Temperature ranged from 0 to 25 °C, and specific conductance ranged from 169 to 275 μS/cm. Dissolved-oxygen concentrations ranged from 11.0 to 14.8 mg/L, and pH ranged from 6.80 to 8.78. Results of chemical analyses of surface-water samples from the monitoring sites are shown in table 6, and results of chemical analyses of samples from the low-flow sites are shown in table 7.

Nitrogen and phosphorus

Concentrations of dissolved nitrogen and dissolved phosphorus in surface-water samples from Stony Brook are shown in figure 15. Concentrations of dissolved inorganic nitrogen equal to or greater than 0.3 mg/L were present in the majority of these samples. The exceptions included the sample collected from monitoring site 01401000 on June 2, 1987, and the low-flow sample collected from site 01400970 in April 1988. Total dissolved-phosphorus concentrations were equal to or greater than 0.1 mg/L in four of the samples collected from monitoring sites and in the sample collected from low-flow site 01400947. Concentrations of total nitrogen and total phosphorus were lowest in the sample from low-flow site 01400913. These concentrations were less than the range or concentrations measured in the samples collected from the monitoring sites.

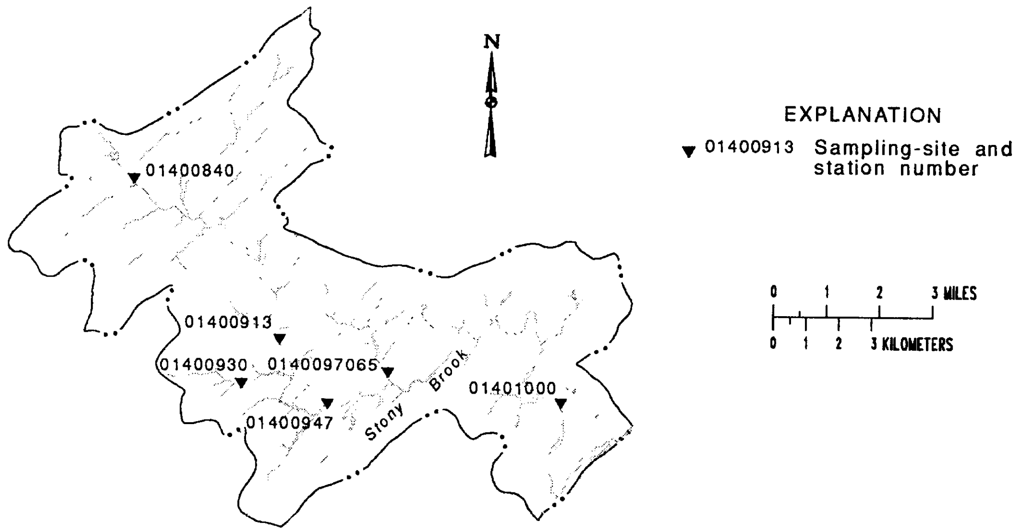
Trace elements in bottom sediments and surface waters

Samples of the bottom sediments and surface water from Stony Brook were analyzed for up to 47 trace elements. Results of trace-element analyses of surface-water samples from monitoring site 01401000, low-flow surface-water samples, and bottom-sediment samples are shown in tables 6, 7, and 8, respectively.

Samples from the five bottom-sediment sites on Stony Brook (01400840, 01400913, 01400947, 01400985, 01401000) contained lead in concentrations that ranged from 45 mg/L (at site 01400913) to 150 mg/L (at site 01401000). Concentrations of copper did not vary significantly. The concentration of zinc ranged from 160 mg/L (at site 01400913) to 230 mg/L (at sites 01400985 and 01401000), the highest concentration of this element in the study area. The concentration of lead at site 01401000 was up to three times those at other Stony Brook sites and was also the highest found in the study area. Runoff from well-traveled roads (U.S. Highway 206 and Rosedale Road) that cross Stony Brook in the lower reaches of the basin is a possible source of trace elements.

Concentrations of the following trace elements in bottom samples were at or below reporting levels: silver, arsenic, gold, bismuth, cadmium, europium, holmium, molybdenum, tin, tantalum, and uranium. Concentrations of the other trace elements determined were of minor geochemical importance.

Most of the trace elements detected in surface-water samples were present at concentrations less than USEPA primary or secondary drinking-water regulations (U.S. Environmental Protection Agency, 1988a; U.S. Environmental Protection Agency, 1988c). In the sample collected from



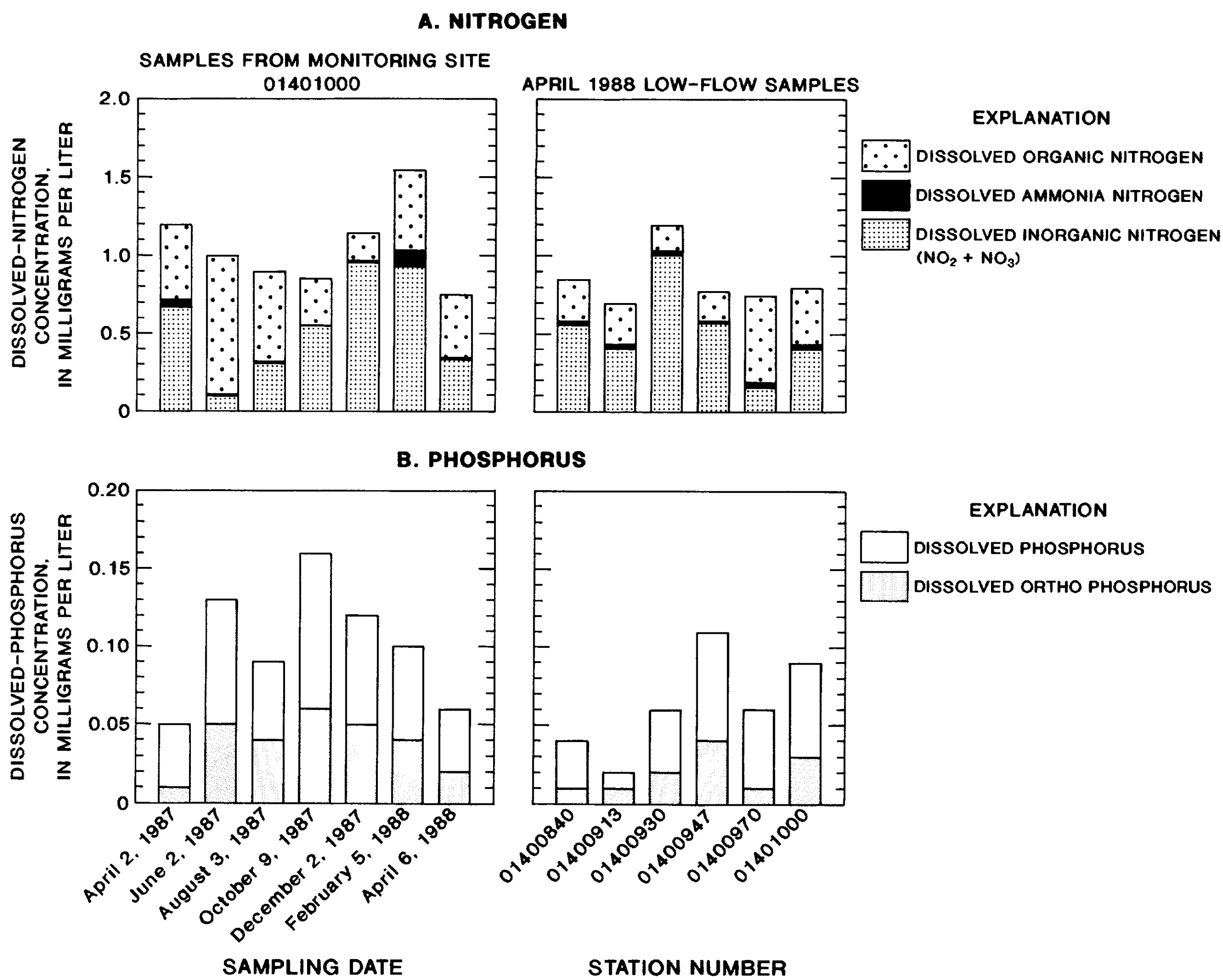


Figure 15.--Concentrations of (A) dissolved nitrogen and (B) dissolved phosphorus in surface-water samples from Stony Brook.

monitoring site 01401000 on August 3, 1987, however, chromium was present at a concentration of 140 μg/L. The USEPA primary maximum contaminant level for chromium is 50 μg/L (U.S. Environmental Protection Agency, 1988a).

Concentrations of the following trace elements in low-flow surface-water samples were at or below reporting levels: arsenic, cadmium, chromium, nickel, selenium, and mercury. The following trace elements were found in concentrations greater than reporting levels: boron (maximum concentration 70 μg/L); copper (maximum concentration 4 μg/L); iron (maximum concentration 140 μg/L); lead (maximum concentration 9 μg/L); manganese (maximum concentration 58 μg/L); zinc (maximum concentration 4 μg/L); and aluminum (maximum concentration 20 μg/L).

Trace elements found in concentrations at or below reporting levels in surface-water samples from monitoring site 01401000 include arsenic, beryllium, cadmium, selenium, and mercury. The following trace elements were found in concentrations greater than reporting levels: boron (maximum concentration 50 μg/L; chromium (maximum concentration 140 μg/L); copper (maximum concentration 5 μg/L); iron (maximum concentration 150 μg/L); lead (maximum concentration 30 μg/L); manganese (maximum concentration 21 μg/L); nickel (maximum concentration 4 μg/L); zinc (maximum concentration 15 μg/L); and aluminum (maximum concentration 170 μg/L).

Organic compounds in bottom sediments

Ratios of concentrations of organic compounds to concentration of total organic carbon in bottom sediments in Stony Brook are shown in table 12. Results of chemical analyses show that several types of persistent organic compounds are present in these sediments: chlorinated insecticides, PCB's, organophosphorus insecticides, and polycyclic aromatic hydrocarbons. The variety and concentration of these compounds show a strong increasing trend from site to site in the downstream direction.

The chlorinated insecticides found include heptachlor, heptachlor epoxide, dieldrin, DDT, DDE, DDD, and chlordane. The polycyclic aromatic hydrocarbons found include anthracene, fluoranthene, pyrene, phenanthrene, and napthhalene. Diazinon is an organphosphorus insecticide. Concentrations of all organic compounds determined in samples of bottom sediments are shown in table 10.

As is the case with organic compounds found in bottom sediments in Jacobs Creek, uses and possible sources of these compounds vary. Runoff from local agricultural areas may account for the presence of the insecticides. PCB's are used in plasticizers, lubricants, and transformer fluids, and the highest concentrations typically are found near industrial areas (Smith and others, 1988, p. 35). The polycyclic aromatic hydrocarbons found are used in a variety of industrial applications, including dyes, insecticides, fungicides, and explosives (Verschueren, 1983).

Macroinvertebrate diversities and population densities

A statistical summary of the results of biological analyses of stream samples is shown in table 11 (at end of report).

Table 12.--Ratio of concentrations of organic compounds to concentration of total organic carbon in bottom sediments in Stony Brook

[Dashes indicate concentration of organic compound below laboratory detection limit]

	Ratio x 1,000				
	Site				
Compound	01400840	01400913	01400947	01400985	01401000
Anthracene	---	---	700	---	---
Chlordane	---	3.7	3.3	3.4	26
DDD	---	.4	.7	1	5.9
DDE	.1	.4	1	1.7	---
DDT	---	---	2.7	4.5	---
Diazinon	---	---	---	---	.4
Dieldrin	---	---	1	1	1.3
Fluoranthene	---	---	---	---	870
Heptachlor	---	---	---	---	.9
Heptachlor epoxide	---	---	---	---	1.7
Naphthalene	---	---	1,630	---	---
PCB	---	---	10	10	110
Pyrene	---	---	---	---	700
Phenanthrene	---	---	---	---	540

Macroinvertebrate population densities differed significantly among sites 01400880, 01400947, 01400985, and 01401000 during spring, summer, and fall 1987 (fig. 16). Samples collected during spring 1987 contained 250.7 MI/SF, 2,244.7 MI/SF, 771.3 MI/SF, and 171.7 MI/SF at sites 01400880, 01400947, 01400985, and 01401000, respectively. Samples collected during summer 1987 contained 307 MI/SF, 1,007.7 MI/SF, 617 MI/SF, and 154.3 MI/SF at sites 01400880, 01400947, 01400985, and 01401000, respectively. Samples collected during fall 1987 contained 199.7 MI/SF, 688.7 MI/SF, 1,311.3 MI/SF, and 79.3 MI/SF at sites 01400880, 01400947, 01400985, and 01401000, respectively.

Species diversity decreased downstream between sites 01400880 and 01400947 in spring, summer, and fall 1987. This suggests an increase in organic loads between these sites. Results of chemical analyses of samples collected from low-flow sites in April 1988 showed significant increases in dissolved phosphorus and dissolved orthophosphorus at this site compared with those sites further upstream. Algal growth, easily visible in Stony Brook at, and downstream from, site 01400947, also suggests nutrient enrichment.

The three samples collected in 1987 showed very low population densities at site 01401000, suggesting a toxic effect on the macroinvertebrate community. An oil spill that occurred between these two sites in 1986 probably had an adverse effect on the community and may account for the decreases (Barbara Kurtz and Christopher Dwyer, New Jersey Department of Environmental Protection and Energy, oral commun., 1989). Results of chemical analyses of samples collected from low-flow sites in April 1988 did not show a decrease in concentrations of dissolved nitrogen and dissolved phosphorus at site 01401000 compared with those at the nearest upstream sampling site.

Beden Brook

Major ions and field measurements

The compositions of the samples collected from monitoring sites on Beden Brook with respect to major cations and anions are displayed in figure 17. Calcium and sodium plus potassium were dominant or codominant cations in all of the samples. Bicarbonate was the dominant anion in all but two of the samples. Sulfate and bicarbonate were codominant in the sample collected from low-flow site 01401515 (point A on the Piper diagram). The dominance of chloride in the sample collected on February 4, 1988, also is seen in the samples collected in February from Jacobs Creek and Stony Brook. The dominance of chloride and a slight shift in cation percentages toward sodium plus potassium in these samples may be a result of winter road salting.

Field measurements of temperature, specific conductance, dissolved oxygen, and pH were made prior to all sampling. Temperature ranged from 2.5 to 22.5 °C, and specific conductance ranged from 149 to 232 μS/cm. Dissolved-oxygen concentrations ranged from 6.2 to 12.5 mg/L, and pH ranged from 6.8 to 8.9. Results of chemical analyses of surface-water samples from the monitoring sites are shown in table 6, and results of chemical analyses of samples from the low-flow sites are shown in table 7.

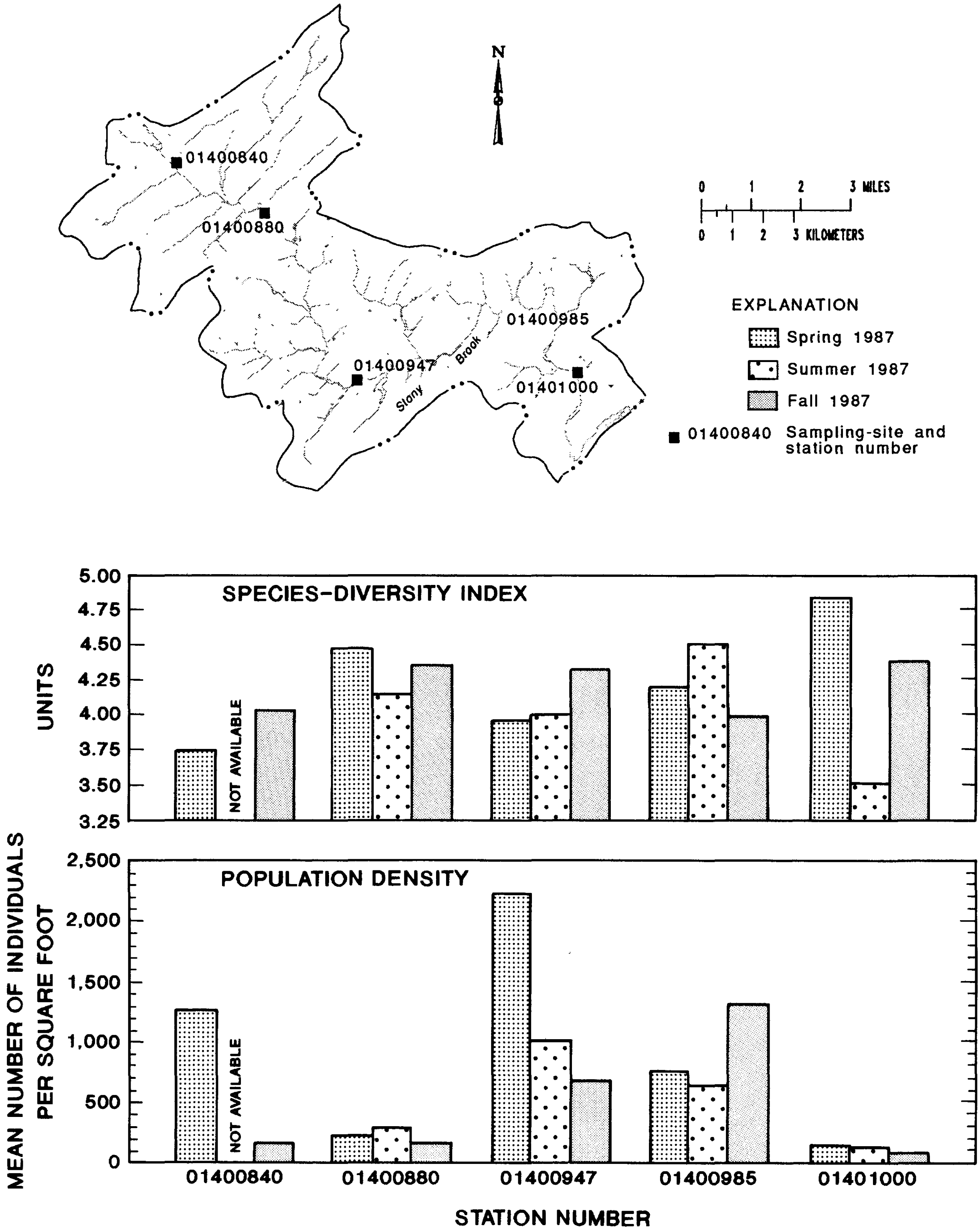


Figure 16.--Macroinvertebrate species diversity and population densities at sampling sites on Stony Brook.

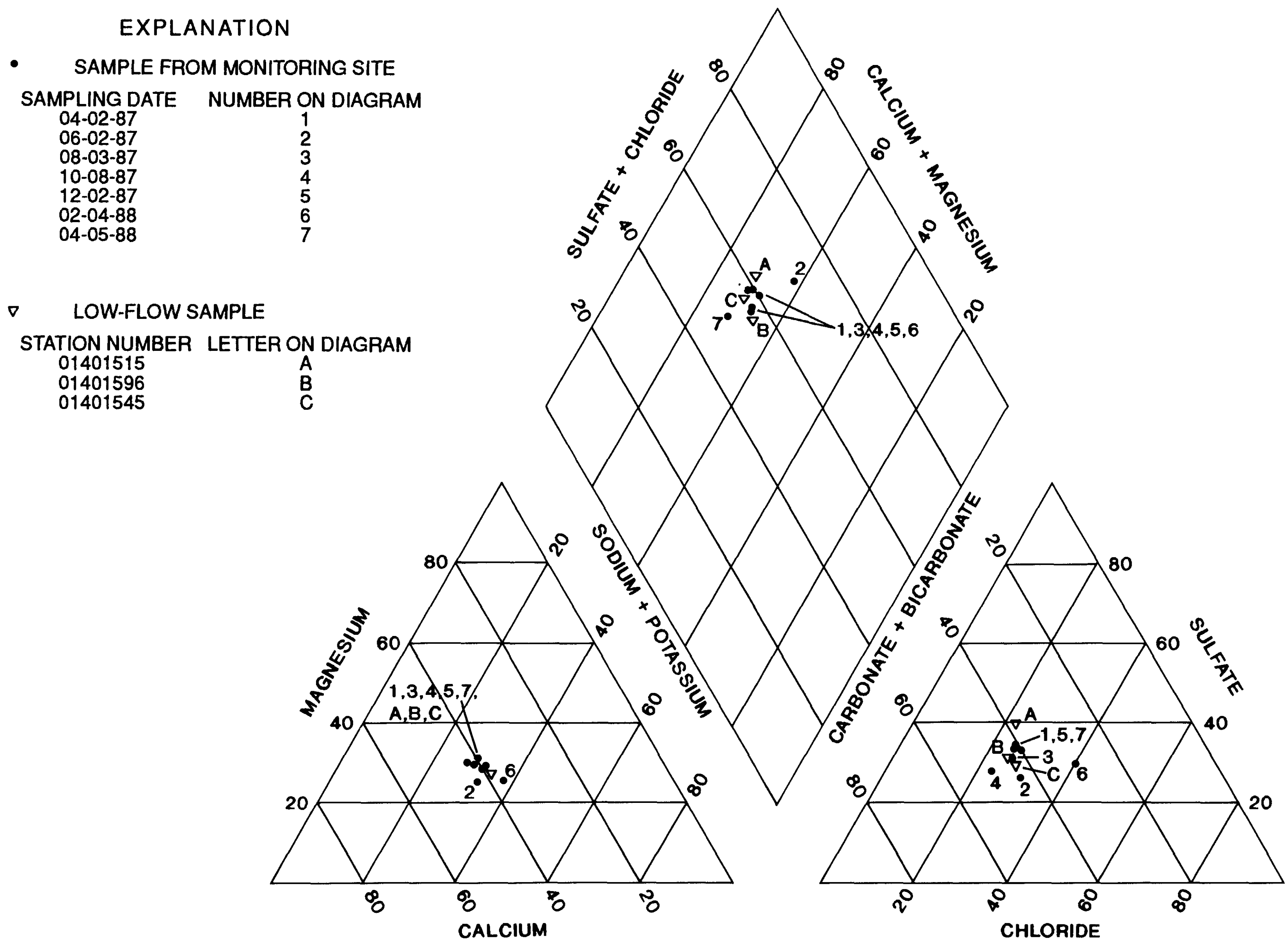


Figure 17.--Percentage distribution of major anions and cations in surface-water samples from Beden Brook.

Nitrogen and phosphorus

Concentrations of dissolved nitrogen and dissolved phosphorus in surface-water samples collected from sampling sites on Beden Brook are shown in figure 18. The majority of samples from Beden Brook contained dissolved inorganic nitrogen in concentrations greater than 0.3 mg/L. The exception was the sample collected at low-flow site 01401515, which contained 0.18 mg/L of dissolved inorganic nitrogen. Total dissolved-phosphorus concentrations were equal to or greater than 0.1 mg/L in four of the samples collected from monitoring sites, and in samples from low-flow sites 01401545 and 01401596. The sample from low-flow site 01401515 contained the lowest concentrations of total nitrogen and total phosphorus--<0.38 and <0.03, respectively. These values were outside the range of concentrations found in the samples from the monitoring site. Some of the samples from Beden Brook contained the highest concentrations of total dissolved nitrogen and total dissolved phosphorous found in surface-water samples from any of these basins.

Trace elements in bottom sediments and surface waters

Samples of the bottom sediments and surface water from Beden Brook were analyzed for up to 47 trace elements. Results of trace-element analyses of surface-water samples from monitoring site 01401600, low-flow surface-water samples, and bottom-sediment samples are shown in tables 6, 7, and 8, respectively.

Concentrations of lead, zinc, and copper varied minimally in Beden Brook bottom-sediment samples compared with those from Jacobs Creek and Stony Brook.

Concentrations of the following trace elements in bottom samples were at or below reporting levels: silver, gold, europium, holmium, molybdenum, tin, tantalum, and uranium. Concentrations of the other trace elements determined are of minor geochemical importance.

Most of the trace elements detected in surface-water samples were present at concentrations less that USEPA primary or secondary drinking-water regulations (U.S. Environmental Protection Agency, 1988a; U.S. Environmental Protection Agency, 1988c). In the samples collected from the monitoring site 01401600 on August 3, 1987, and December 2, 1987, however, chromium was present at concentrations of 130 μg/L and 290 μg/L, respectively. The USEPA primary maximum contaminant level for chromium is 50 μg/L (U.S. Environmental Protection Agency, 1988a). Manganese was present in samples collected from the monitoring site on June 2, 1987, and August 3, 1987, at concentrations of 100 μg/L and 68 μg/L, respectively. The USEPA secondary maximum contaminant level for manganese is 50 μg/L (U.S. Environmental Protection Agency, 1988c).

Concentrations of the following trace elements in low-flow surface-water samples were at or below reporting levels: arsenic, cadmium, chromium, lead, selenium, and mercury. The following trace elements were found in concentrations greater than reporting levels: boron (maximum

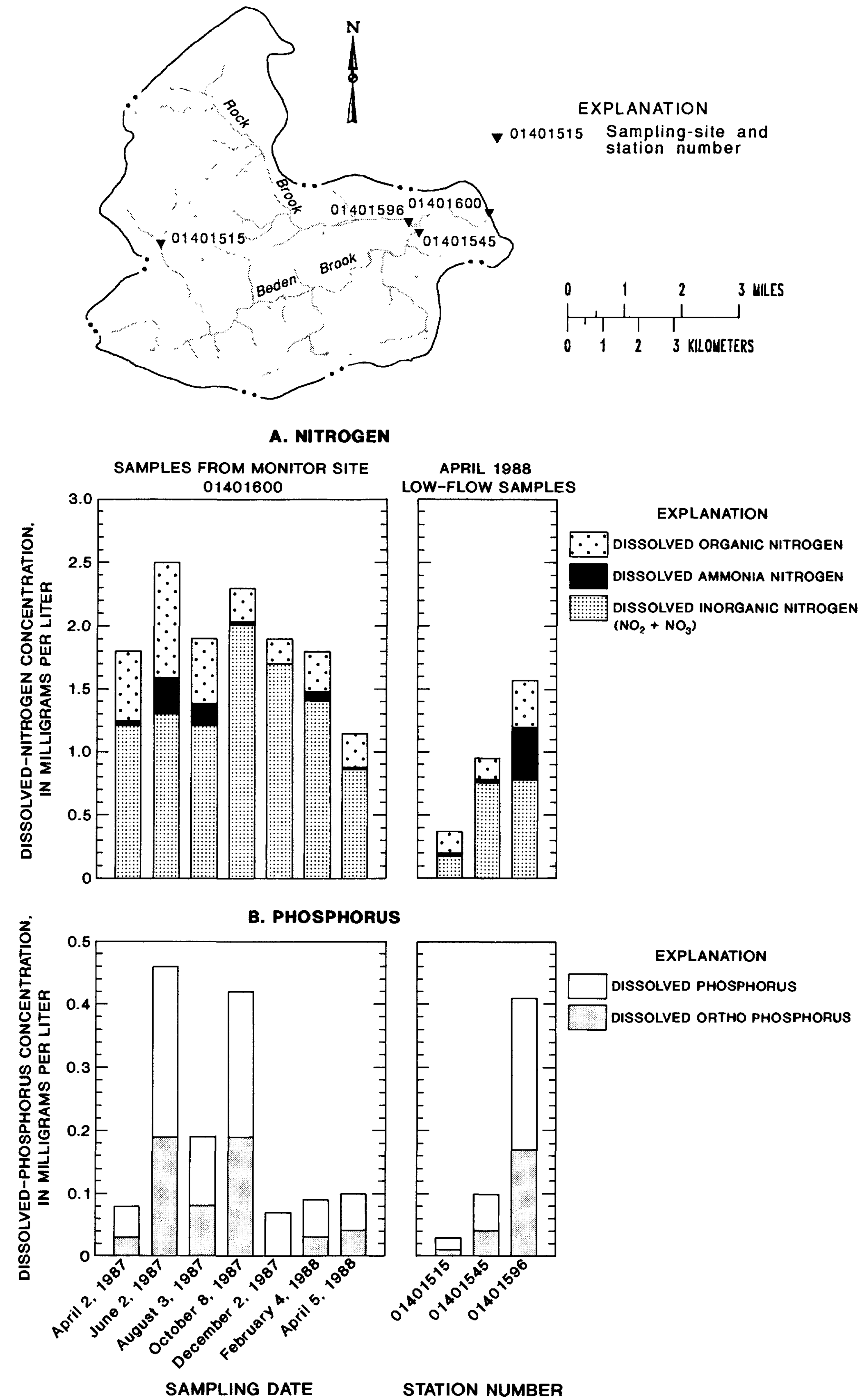


Figure 18.--Concentrations of (**A**) dissolved nitrogen, and (**B**) dissolved phosphorus in surface-water samples from Beden Brook.

concentration 30 μg/L); copper (maximum concentration 8 μg/L); iron (maximum concentration 140 μg/L); manganese (maximum concentration 11 μg/L); nickel (maximum concentration 2 μg/L); zinc (maximum concentration 6 μg/L); and aluminum (maximum concentration 30 μg/L).

Trace elements found in concentrations at or below reporting levels in surface-water samples from monitoring site 01401600 include beryllium, cadmium, lead, selenium, and mercury. The following trace elements were found in concentrations greater than reporting levels: arsenic (maximum concentration 2 μg/L); boron (maximum concentration 60 μg/L); chromium (maximum concentration 290 μg/L); copper (maximum concentration 8 μg/L); iron (maximum concentration 110 μg/L); manganese (maximum concentration 100 μg/L); nickel (maximum concentration 4 μg/L); zinc (maximum concentration 23 μg/L); and aluminum (maximum concentration 110 μg/L).

Organic compounds in bottom sediments

Ratios of concentrations of organic compounds to concentration of total organic carbon in bottom sediments in Beden Brook are shown in table 13. Results of chemical analyses show the presence of several persistent chlorinated organic compounds in these sediments. PCB's, found in the lower reaches of the stream, were present in the highest concentrations (120 μg/kg (micrograms per kilogram)) at site 01401600. The chlorinated insecticides dieldrin, DDE, DDD, and chlordane were present at all four sites sampled. Concentrations of all organic compounds determined in bottom sediments are shown in table 10.

As is the case with organic compounds found in bottom sediments in Jacobs Creek and Stony Brook, uses and possible sources of these compounds vary. Runoff from local agricultural land probably accounts for the presence of the chlorinated insecticides. PCB's are used in plasticizers, lubricants, and transformer fluids, and the highest concentrations are typically found near industrial areas (Smith and others, 1988, p. 35). Atmospheric deposition is a mechanism by which PCB's can accumulate in surface waters (Smith and others, 1988, p. 30).

Macroinvertebrate diversities and population densities

A statistical summary of the results of biological analyses of stream samples is shown in table 11 (at end of report). Macroinvertebrate population densities varied among sites 01401520, 01401521, 01401535, 01401545, and 01401600 during spring, summer, and fall 1987 (fig. 19). The lowest population density found was 243.7 MI/SF at site 01401545, and the highest found was 2,558 MI/SF at site 01401520, both during summer 1987. The changes in population densities, however, were accompanied by little change in species diversity, suggesting that macroinvertebrate communities were stable and were not significantly affected by organic loading or toxic effects.

SUMMARY AND CONCLUSIONS

Ground-water-level maps of the Jacobs Creek, Stony Brook, and Beden Brook drainage basins were prepared from water levels measured synoptically in 74 wells in October 1987. The results indicate that, in general, the

Table 13.--Ratio of concentrations of organic compounds to concentration of total organic carbon in bottom sediments in Beden Brook

[Dashes indicate concentration of organic compound below laboratory detection limit]

	Ratio x 1,000			
	Site			
Compound	01401515	01401521	01401535	01401600
Chlordane	---	1.7	---	---
DDD	---	.3	---	.2
DDE	.3	.5	.2	---
Dieldrin	---	.3	---	.4
PCB	---	---	1.9	220

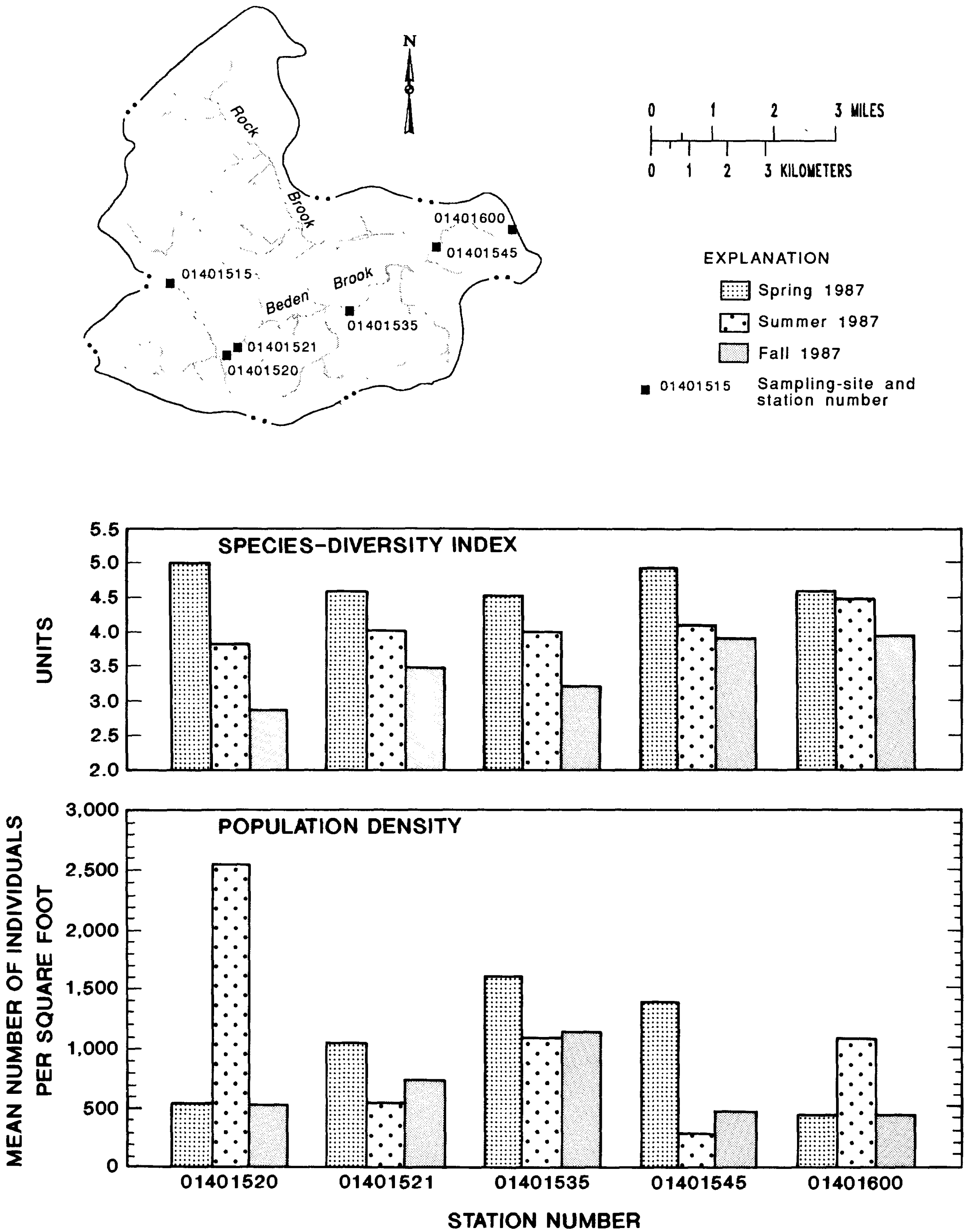


Figure 19.--Macroinvertebrate species diversity and population densities at sampling sites on Beden Brook.

ground-water and surface-water divides between the drainage basins of Stony Brook, Beden Brook, and Jacobs Creek coincide. Variations in ground-water altitudes typically mimic variations in topography. The water-level altitude in well 210348, however, indicates the possibility of local ground-water flow between the Stony Brook and Jacobs Creek basins. Water levels were less than 40 ft below land surface in most of the wells measured.

Water-quality samples were collected from 25 wells that were evenly distributed across the study area. Results of chemical analyses of these samples indicate that calcium was proportionately the most abundant cation and bicarbonate was the most abundant anion in the majority of samples. Sodium was the dominant cation in a sample from a well drilled into the Stockton Formation and from a well drilled into diabase. With one exception, concentrations of nutrients, trace elements, and the volatile organic compounds determined met New Jersey primary drinking-water regulations. A water sample from well 210277 in the Borough of Hopewell contained 12 $\mu g/L$ tetrachloroethylene--a concentration that exceeds the New Jersey maximum contaminant level of 1 $\mu g/L$. USEPA secondary maximum contaminant levels were exceeded in one well (by a factor of 4) for iron, and in five wells (up to a factor of 7) for manganese. Concentrations of dissolved organic carbon ranged from 0.1 to 1.0 mg/L.

Surface-water discharge was measured at 63 sites during low-flow conditions in August and November 1987 in Jacobs Creek, Stony Brook, and Beden Brook. The highest runoff at a main-stem site (0.89 $(ft^3/s)/mi^2$) was at site 01462733 on Jacobs Creek. Average runoff at main-stem sites in August and November 1987 was highest at Jacobs Creek (0.70 $(ft^3/s)/mi^2$) and lowest at Stony Brook (0.18 $(ft^3/s)/mi^2$). Runoff generally increased downstream in Jacobs Creek, Stony Brook, and Beden Brook; exceptions could result from ground-water recharge or measurement error.

The flow-duration curve for Stony Brook during 1987-88 shows that this period was wetter than the 34-year long-term average. Similar conditions probably prevailed in Beden Brook and Jacobs Creek, given the proximity and similar geology of the three basins.

A continuous discharge record was obtained on Stony Brook at Princeton throughout the study period. Daily mean discharge of Stony Brook at Princeton from October 1986 to September 1988 did not show any extremes greater than those in the long-term record that began in October 1953.

Water-chemistry samples were collected (1) bimonthly from April 1987 through April 1988 at monitoring sites on Jacobs Creek, Stony Brook, and Beden Brook; and (2) during low-flow conditions in April 1988 at 12 sites throughout the study area. Bottom-sediment samples were collected once at 11 stream sites from August through November 1987. Stream macroinvertebrate samples were collected three times--during spring, summer, and fall 1987--at 15 sites.

Results of water-chemistry analyses of all samples from low-flow and monitoring sites on Jacobs Creek indicate a calcium plus sodium plus bicarbonate plus chloride water type for both low-flow and monitoring samples. These results also indicate that concentrations of inorganic nitrogen typically exceeded 0.3 mg/L, the concentration above which eutrophication usually occurs. Trace elements in the stream water were present at concentrations equal to or only slightly greater than detection limits.

For all three streams, field measurements of temperature, specific conductance, dissolved oxygen concentration, and pH were made prior to all water-chemistry sampling. In Jacobs Creek, temperature ranged from 2.5 to 28 ^{o}C, specific conductance ranged from 182 to 292 μS/cm, dissolved-oxygen concentrations ranged from 8.0 to 14.0 mg/L, and pH ranged from 7.3 to 9.58.

Results of analyses of bottom-sediment samples from Jacobs Creek for organic compounds indicate that two types of persistent organic compounds were present at site 01462760: chlorinated insecticides and polycyclic aromatic hydrocarbons. The insecticides may be derived from runoff from local agricultural areas. Bottom-sediment samples analyzed for trace elements contained zinc in concentrations of 150 and 120 mg/L, and lead in concentrations of 39 and 44 mg/L--concentrations slightly lower than those in Stony Brook and Beden Brook.

Increases in macroinvertebrate population densities between sites 01462730 and 01462739 accompanied by downstream decreases in species diversities suggest that an increase in organic loads to this section of the stream is likely.

Results of water-chemistry analyses of samples from Stony Brook indicate that calcium and sodium were codominant cations and bicarbonate was the dominant anion in most samples. Chloride was the dominant anion in the sample collected from monitoring site 01401000 on February 5, 1988. Results also indicate that concentrations of inorganic nitrogen and total phosphorus typically exceeded 0.3 mg/L and 0.1 mg/L, respectively. Trace-element concentrations in samples of stream water were negligible, except for the sample collected from the monitoring site on August 3, 1987, which contained chromium in a concentration of 140 μg/L. The United States Environmental Protection Agency (USEPA) primary maximum contaminant level for chromium is 50 μg/L. Temperature ranged from 0 to 25 °C, specific conductance ranged from 169 to 275 μS/cm, dissolved-oxygen concentrations ranged from 11.0 to 14.8 mg/L, and pH ranged from 6.80 to 8.78.

Results of analyses of bottom-sediment samples from Stony Brook for trace elements indicate a downstream increase in concentrations of lead and zinc. The highest concentration of lead in all bottom-sediment samples, 150 mg/L at site 01401000, may be the result of road runoff from the heavily traveled Route 206 and Rosedale Road. Results of analyses of bottom-sediment samples for organic compounds indicate the presence of several types of persistent organic compounds, including chlorinated and organophosphorous insecticides, polycyclic aromatic hydrocarbons, and PCB's. The number and concentrations of these compounds generally increased downstream. The insecticides may be derived from runoff from local agricultural areas.

Increases in macroinvertebrate population densities between sites 01400880 and 01400947 accompanied by decreases in species diversities suggest that an increase in organic loads to this section of the stream is likely. Very low population densities at site 01401000 accompanied by decreases in the number of taxa suggest the effect of a toxic agent on the macroinvertebrate community in this area. An oil spill upstream from the site is a possible cause.

Results of water-chemistry analyses of samples from Beden Brook indicate that calcium and sodium were dominant or codominant cations in all samples, and bicarbonate was the dominant or codominant anion in most samples. Chloride was the dominant anion in the sample collected from monitoring site 01401600 on February 4, 1988. The dominance of chloride also is seen in the samples collected from the monitoring sites on Jacobs Creek and Stony Brook in February 1988, and may be an effect of winter road salting. These analysis results also indicate that concentrations of inorganic nitrogen typically exceeded 0.3 mg/L. Samples from Beden Brook contained the highest concentrations of total nitrogen and total phosphorous in the study area. Trace-element concentrations in stream-water samples were negligible, except for the sample collected from the monitoring site on August 3, 1987, which contained chromium in a concentration of 130 μg/L, and the sample collected from the monitoring site on December 2, 1987, which contained chromium in a concentration of 290 μg/L. Temperature ranged from 2.5 to 22.5 ^{0}C, specific conductance ranged from 149 to 232 μS/cm, dissolved-oxygen concentrations ranged from 6.2 to 12.5 mg/L, and pH ranged from 6.8 to 8.9.

Results of analyses of bottom-sediment samples for trace elements indicate that concentrations of lead, zinc, and copper varied minimally compared with those from Jacobs Creek and Stony Brook. All samples analyzed for organic compounds contained chlorinated insecticides and two, from sites 01401535 and 01401600, contained PCB's. The presence of insecticides may be derived from runoff from local agricultural areas.

Changes in population densities between sites on Beden Brook were accompanied by little change in species diversities, suggesting that macroinvertebrate communities were stable and were not significantly affected by organic loading or toxic effects.

REFERENCES CITED

Baedecker, Philip A., ed., 1987, Methods for geochemical analysis: U.S. Geological Survey Bulletin 1770, 132 p.

Betz-Converse-Murdoch, Inc., 1978, Impact of sewering and increased demand on groundwater resources in Hopewell Township, New Jersey: Hopewell Township Municipal Utilities Authority, 37 p.

Chiou, C.T., Peters, L.J., and Freed, V.H., 1979, A physical concept of soil-water equilibria for nonionic organic compounds: Science, v. 206, no. 4420, p. 831-832.

Claassen, H.C., 1982, Guidelines and techniques for obtaining water samples that accurately represent the water chemistry of an aquifer: U.S. Geological Survey Open-File Report 82-1024, 49 p.

Goerlitz, D.F., and Brown, E., 1972, Methods for analysis of organic substances in water: U.S. Geological Survey Techniques of Water-Resources Investigations, book 5, chap. A3, 40 p.

Hardy, M.A., Leahy, P.P., and Alley, W.M. 1989, Ground-water field procedures for the pilot National Water-Quality Assesment Program: U.S. Geological Survey Open-File Report 89-396, 36 p.

Horowitz, A.J., 1985, A primer on trace element sediment chemistry: U.S. Geological Survey Water-Supply Paper 2277, 67 p.

Kasabach, H.F., 1966, Geology and ground water resources of Hunterdon County, N.J.: Division of Water Policy and Supply, Special Report No. 24, 128 p.

Lloyd, M., Zar, J.H., and Karr, J.R., 1968, On the calculation of information-theoretical measures of diversity: American Midland Naturalist, v. 79, no. 2, p. 257-272.

Lyttle, P.T., and Epstein, J.B., 1987, Geologic map of Newark 1° x 2° quadrangle, New Jersey, Pennsylvania, and New York: U.S. Geological Survey Miscellaneous Investigations Series, Map I-1715, 2 sheets, scale 1:250,000.

Mackenthun, K.M., 1969, The practice of water pollution biology: Washington, D.C., U.S. Department of the Interior, Federal Water Pollution Control Administration, U.S. Government Printing Office, 281 p.

Mansue, L.J., and Anderson, P.W., 1974, Effects of land use and retention practices on sediment yields in the Stony Brook Basin, New Jersey: U.S. Geological Survey Water-Supply Paper 1798-L, 33 p.

New Jersey Department of Environmental Protection, 1987, Field procedures manual for water data aquisition: Trenton, N.J., p. 106, 11 appendixes.

New Jersey Register, 1989, v. 21, no. 54, January 3, 1989.

Rantz, S.E., and others, 1982, Measurement and computation of streamflow--Volume 1. Measurement of stage and discharge, Volume 2. Computation of Discharge: U.S. Geological Survey Water-Supply Papeer 2175, 631 p.

Reading, J.T., and Kurtz, B.A., 1982, Beden Brook intensive stream survey: N.J. Department of Environmental Protection, Division of Water Resources, Bureau of Monitoring and Data Management, Intensive Survey no. 823404, June 1983, unpublished report on file at N.J. Department of Environmental Protection and Energy, Trenton, N.J., 39 p.

Schopp, R.D., and Bauersfeld, W.R., 1985, New Jersey surface-water resources, in Moody, D.W., Chase, E.B., and Aronson, D.A., eds., National Water Summary 1985: U.S. Geological Survey Water-Supply Paper 2300, p. 335-340.

Searcy, J.K., 1959, Flow-duration curves: U.S. Geological Survey Water-Supply Paper 1542-A, 33 p.

Skougstad, M.W., Fishman, M.J., Friedman, L.C., Erdmann, D.E., and Duncan, S.S., eds., 1979, Methods for determination of inorganic substances in water and fluvial sediments: U.S. Geological Survey Techniques of Water-Resources Investigations, book 5, chap. A1, 626 p.

Slack, K.V., Averett, R.C., Greeson, P.E., and Lipscomb, R.G., 1973, Methods for collection and analysis of aquatic biological and microbiological samples: U.S. Geological Survey Techniques of Water-Resources Investigations, book 5, chap. A1, 165 p.

Smith, J.A., Harte, P.T., and Hardy, M.A., 1987, Trace-metal and organochlorine residues in sediments of the upper Rockaway River, New Jersey: Bulletin of Environmental Contamination and Toxicology, v. 39, p. 465-473.

Smith, J.A., Witkowski, P.J., and Fusillo, T.V., 1988, Man-made organic compounds in the surface waters of the United States--A review of current understanding: U.S. Geological Survey Circular 1007, 92 p.

Thurman, E.M., 1985, Organic geochemistry of natural waters: Dordrecht, the Netherlands, Martinus Nijhoff/Dr W. Junk, 497 p.

U.S. Environmental Protection Agency, 1988a, Maximum contaminant levels (subpart B of 141, National interim primary drinking-water regulations): U.S. Code of Federal Regulations, Title 40, Parts 100 to 149, revised as of July 1, 1988, p. 530-533.

____ 1988b, National revised primary drinking-water regulations: Maximum contaminant levels (subpart G of part 141, National interim primary drinking-water regulations): U.S. Code of Federal Regulations, Title 40, Parts 100 to 149, revised as of July 1, 1988, p. 586-587.

____ 1988c, Secondary maximum contaminant levels (section 143.3 of part 143, National secondary drinking-water regulations): U.S. Code of Federal Regulations, Title 40, Parts 100 to 149, revised as of July 1, 1988, p. 608.

Vecchioli, John, and Palmer, M.M., 1962, Ground-water resources of Mercer County, N.J.: New Jersey Department of Conservation and Economic Development, Special Report 19, 71 p.

Vecchioli, John, Carswell, L.D., and Kasabach, H.F., 1969, Occurrence and movement of ground water in the Brunswick shale at a site near Trenton, New Jersey: U.S. Geological Survey Professional Paper 650-B, p. 154-157.

Verschueren, Karel, 1983, Handbook of environmental data on organic chemicals (2d ed.): New York, Van Nostrand Reinhold, 1,310 p.

Widmer, Kemble, 1965, Geology of the ground water of Mercer County: New Jersey Department of Conservation and Economic Development, Bureau of Geology and Topography, Geologic Report Series no. 7, 115 p.

Wood, W.W., 1976, Guidelines for collection and field analysis of ground-water samples for selected unstable constituents: U.S. Geological Survey Techniques of Water-Resources Investigations, book 1, chap. D2, 24 p.

- PAGE 50 FOLLOWS -

Table 2.--Locations, well-construction, and hydrogeologic data for wells in the study area

[-- indicates missing value; (gal/min)/ft, gallons per minute per foot; DOM, domestic; *, observation well; 227 PSSC, Passaic Formation; 231 BSLT, Diabase; 231 LCKG, Lockatong Formation; 231 SCKN, Stockton Formation]

New Jersey well number	Location		Altitude of land surface (feet)	Depth of well (feet)	Depth of bottom of casing (feet)	Aquifer code	Local well name
	Latitude	Longitude					
190233	402351	0745056	370	100	30	227PSSC	ARGUS INTERNATIONAL 1
190234	402446	0744908	470	100	51	231LCKG	PISARCIK
190239	402407	0745005	385	42	25	231BSLT	WASABAUGH DOM E
190240	402426	0744939	439	146	22	231BSLT	BIOMQUIST DOM
190241	402343	0744918	309	192	22	231LCKG	COLONIAL SM DOM & POOL 1
190242	402335	0745014	305	400	31	227PSSC	HELEWA 1
*210088	402128	0744613	179.5	150	20	227PSSC	HONEY BRANCH 10
210090	402000	0744658	140	400	--	231SCKN	PWD 5D
210242	402040	0744635	157	600	50	227PSSC	MOBIL RESEARCH 2
210250	402142	0744348	205	400	31	227PSSC	RESEARCH LAB 3
210251	402045	0744248	125	223	15	231LCKG	ETS 2 IS NEW ETS 1
210265	402420	0744521	355	275	50	231SCKN	ANDERSON FARM-1981
210275	401905	0744736	200	300	81.2	227PSSC	WD 7
210277	402314	0744611	200	380	50	227PSSC	4-LOUELLEN ST
*210289	401753	0744835	215	300	12	231LCKG	BRISTOL-MYER 100-1959
210291	401910	0745001	210	200	41	227PSSC	ASTALOSH
210292	402208	0745050	310	175	50	231LCKG	COLIVITA
210293	401951	0744011	110	305	45	231SCKN	INSTITUTE ADV STUDY 1
210294	402215	0744138	270	220	50	231BSLT	KEIFER
210295	402123	0744521	140	130	40	227PSSC	LEICHT
210296	402430	0744640	430	250	50	231LCKG	MCALINDEN
210297	401819	0745028	150	205	50	227PSSC	MITCHELL
210298	402359	0744512	186	175	50	227PSSC	SLATER
210299	402149	0744810	250	215	62	227PSSC	STANIAR
210300	401823	0744743	220	135	38	231LCKG	SUFNAR
210301	402023	0744508	170	200	56	227PSSC	STONE
210302	402207	0744342	343	290	42	231BSLT	WECHSLER
210303	402128	0744945	350	115	30	231SCKN	WEINROTH
210312	402110	0745109	329	118	30	231LCKG	ROBERTSON DOM
210313	402147	0745053	318	160	40	231LCKG	RILEY DOM 1
210314	402228	0744654	237	165	50	231BSLT	MOORE DOM
210315	402219	0744506	344	300	40	231BSLT	COHEN DOM
210316	402440	0744504	407	240	50	231SCKN	GUNN DOM
210317	402312	0744357	136	140	51	227PSSC	HENDERSON FARM
210321	402043	0744459	142	150	52	227PSSC	KENNEDY DOM
210322	401655	0745112	124	248	30	231LCKG	SELTER 1
210324	401707	0745049	119	135	30	231LCKG	KLEEPEN DOM
210325	401755	0744710	214	190	52	231LCKG	PARSONS BLDG
210326	401817	0745036	164	300	52	227PSSC	MILEWSKI 1
210327	401824	0745019	143	160	50	227PSSC	STILSON DOM
210328	401827	0745021	156	118	53	227PSSC	REINECKE 1
210329	401844	0744703	190	150	52	227PSSC	MALEC DOM
210330	401915	0744755	223	190	50	227PSSC	ROBEX CORP 3
210331	401932	0744542	184	200	31	227PSSC	PELIKAN HOUSING
210332	401949	0744943	188	142	24	227PSSC	MORRISON DOM
210333	402011	0745056	256	80	36	227PSSC	TOWBIN 1
210334	402025	0744956	295	170	95	231BSLT	MATHER DOM
210335	402035	0744943	311	250	38	231BSLT	RALPH 1
210336	402037	0744528	182	164	52	227PSSC	JACOBELLI DOM
210337	402041	0744528	198	200	51	227PSSC	GRAVEN DOM
210338	402045	0744919	300	270	75	231BSLT	BACON DOM
210340	402057	0744522	206	200	51	227PSSC	SCOZZARI DOM
210341	402058	0744741	203	175	42	227PSSC	H VALLEY RAQUETBALL
210342	402113	0744402	218	460	40	227PSSC	EDGE 1
210343	402118	0745118	306	300	47	231LCKG	HANTJIS 1
210344	402136	0744942	384	225	44	231SCKN	FAHERTY DOM
210345	402210	0744428	310	200	61	231BSLT	MAYER DOM
210346	402228	0744550	310	265	50	231BSLT	LEWELLEN DOM
210347	402001	0744315	196	125	52	231LCKG	O NEILL DOM
210348	401900	0744746	189	260	63	227PSSC	EKLUND ENTERPRISE
210349	401757	0744711	210	150	31	231LCKG	ANDREWS BLDG
210350	401801	0744729	198	100	40	227PSSC	GRIFFIS DOM
210351	401907	0744818	176	170	42	227PSSC	STEELE DOM

New Jersey well number	Specific capacity (gal/min)/ft	Depth to water below land surface (feet)	Water-level measurement date	Water-quality sample date
190233	2.5	--	--	04-25-88
190234	.23	16.68	10-05-87	03-31-88
190239	.17	16.44	10-06-87	--
190240	.03	18.76	10-06-87	--
190241	.79	13.07	10-06-87	--
190242	.01	21.10	10-06-87	--
*210088	--	--	--	--
210090	.57	--	--	03-24-88
210242	.82	--	--	03-23-88
210250	.40	--	--	03-23-88
210251	.32	--	--	03-21-88
210265	.07	33.46	10-15-87	03-28-88
210275	2.42	--	--	03-24-88
210277	.62	--	--	03-21-88
*210289	--	--	--	--
210291	.19	--	--	05-03-88
210292	.45	22.30	10-06-87	05-06-88
210293	5.51	--	--	04-29-88
210294	.04	81.35	10-05-87	04-22-88
210295	.89	9.94	10-05-87	04-21-88
210296	.16	45.85	10-05-87	04-04-88
210297	.29	41.42	10-03-87	04-21-88
210298	--	21.33	10-14-87	04-04-88
210299	.11	--	--	04-11-88
210300	.17	15.20	10-06-87	04-26-88
210301	.53	45.06	10-05-87	04-22-88
210302	.01	23.11	10-15-87	03-28-88
210303	.11	36.5	10-05-87	03-30-88
210312	.24	14.58	10-05-87	--
210313	.29	24.40	10-06-87	--
210314	.14	30.82	10-05-87	--
210315	--	20.64	10-14-87	--
210316	.07	22.25	10-15-87	--
210317	.26	**86.80	10-14-87	--
210321	1.36	4.41	10-05-87	--
210322	.02	73.50	10-05-87	--
210324	.15	58.77	10-05-87	--
210325	.43	5.20	10-06-87	--
210326	.06	53.07	10-05-87	--
210327	2.31	38.08	10-05-87	--
210328	.29	42.20	10-05-87	--
210329	.25	22.52	10-06-87	--
210330	.31	70.92	10-06-87	--
210331	.15	14.75	10-06-87	--
210332	.09	16.35	10-05-87	--
210333	.26	8.00	10-05-87	--
210334	.25	58.02	10-05-87	--
210335	.08	32.37	10-05-87	--
210336	.67	42.70	10-05-87	--
210337	.07	69.73	10-05-87	--
210338	.15	37.73	10-05-87	--
210340	.20	62.08	10-05-87	--
210341	.77	28.03	10-23-87	--
210342	.02	55.78	10-05-87	--
210343	--	0	10-03-87	--
210344	.03	17.70	10-05-87	--
210345	.04	21.22	10-05-87	--
210346	.05	56.04	10-05-87	--
210347	.31	10.57	10-05-87	--
210348	.19	99.35	10-06-87	--
210349	.04	26.50	10-06-87	--
210350	.91	17.57	10-06-87	--
210351	.27	57.36	10-06-87	--

** Not a static water-level measurement; see p. 8.

New Jersey well number	Location		Altitude of land surface (feet)	Depth of well (feet)	Depth of bottom of casing (feet)	Aquifer code	Local well name
	Latitude	Longitude					
210352	401935	0744919	238	162	52	227PSSC	ALECH DOM
210353	402137	0744755	203	100	20	227PSSC	STAGE DEPOT MOTEL DOM
210354	401940	0744623	176	140	31	227PSSC	GILLESPIE DOM
210355	402121	0744522	161	125	31	227PSSC	OLMLAND DOM
210356	402014	0744222	175	300	50	231LCKG	YU DOM
210357	402044	0744106	167	250	50	231LCKG	JAFFIN DOM
*210365	402138	0744358	231	99	--	227PSSC	AT&T NORTH WELL
350016	402509	0744142	105	300	41.6	231SCKN	EIGHT
*350028	402510	0744116	120	303	33	227PSSC	SEVEN
350041	402556	0744430	357	200	52	231LCKG	DEMUND 1
350042	402321	0744251	170	--	--	227PSSC	BEDENS BROOK C CLUB 2
350047	402520	0744323	159	145	60	231SCKN	KIRK DOM
350048	402539	0744500	434	165	32	231LCKG	RYAN DOM
350049	402403	0744216	128	180	51	227PSSC	FRENCH 1
350050	402443	0744112	102	260	52	227PSSC	HAGGON DOM & OFC
350051	402620	0744409	348	300	50	231LCKG	MARTIN DOM
350052	402342	0744345	115	175	50	227PSSC	HYLDAHL DOM
350053	402423	0744357	174	200	50	227PSSC	MCBRIDE DOM
350054	402450	0744313	131	160	60	227PSSC	MCNALLY DOM
350055	402406	0744057	104	275	52	227PSSC	FELMEISTER DOM
350056	402559	0744457	412	200	31	231LCKG	DILLIVIO DOM 1
350057	402417	0744356	164	250	50	227PSSC	KEIFER DOM
350058	402438	0744357	196	180	50	227PSSC	DUDEK DOM
350059	402421	0744059	74	420	50	227PSSC	VOORHEES 762
350060	402259	0744250	199	200	63	227PSSC	BERGMAN DOM
350061	402253	0744150	271	230	50	227PSSC	BUCCI DOM

Table 2.--Locations, well-construction, and hydrogeologic data for wells in the study area--Continued

New Jersey well number	Specific capacity (gal/min)/ft	Depth to water below land surface (feet)	Water-level measurement date	Water-quality sample date
210352	0.52	84.85	10-05-87	--
210353	.24	19.86	10-06-87	--
210354	.30	39.63	10-06-87	--
210355	.15	5.14	10-05-87	--
210356	.15	15.00	10-05-87	--
210357	.04	41.22	10-05-87	--
*210365	--	--	--	--
350016	.71	--	--	03-22-88
*350028	.88	29.35	10-15-87	--
350041	.24	5.45	10-15-87	04-04-88
350042	--	--	--	03-22-88
350047	.09	10.06	10-14-87	--
350048	.17	19.58	10-14-87	--
350049	.15	42.00	10-14-87	--
350050	.07	16.00	10-15-87	--
350051	.30	50.81	10-14-87	--
350052	--	10.74	10-15-87	--
350053	.10	10.60	10-15-87	--
350054	1.67	21.83	10-15-87	--
350055	--	31.52	10-14-87	--
350056	.03	20.47	10-15-87	--
350057	--	11.75	10-14-87	--
350058	.25	25.82	10-15-87	--
350059	.07	8.24	10-14-87	--
350060	.24	33.55	10-14-87	--
350061	.07	15.50	10-14-87	--

Table 3.--Results of chemical analyses of ground-water samples

[-- indicates missing value; deg C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; <, less than; tot rec, total recoverable; *, replicate sample; all samples collected by U.S. Geological Survey personnel and analyzed at U.S. Geological Survey National Water-Quality Laboratory in Arvada, Colorado]

New Jersey well number	Sample date	Temperature water (deg C) (00010)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH (standard units) (00400)	pH lab (standard units) (00403)	Nitrogen, ammonia dissolved (mg/L as N) (00608)	Nitrogen, nitrite dissolved (mg/L as N) (00613)	Nitrogen, ammonia + organic dissolved (mg/L as N) (00623)
190233	04-25-88	13.5	--	4.5	6.50	7.00	<0.010	<0.010	<0.20
190234	03-31-88	12.0	120	3.2	6.04	6.70	< .010	< .010	< .20
210090	03-24-88	12.5	410	2.6	7.66	8.30	< .010	< .010	.20
210242	03-23-88	12.5	590	7.9	7.75	8.00	< .010	< .010	< .20
210250	03-23-88	12.0	415	3.2	7.31	7.80	< .010	< .010	< .20
210251	03-21-88	12.0	390	5.9	--	7.90	.010	< .010	< .20
210265	03-28-88	12.5	391	.2	7.67	8.10	< .010	< .010	< .20
210275	03-24-88	12.5	405	4.3	7.79	8.10	< .010	< .010	.20
210277	03-21-88	13.0	455	4.2	--	7.80	< .010	< .010	.30
210291	05-03-88	13.0	470	5.6	7.88	8.40	< .010	< .010	.20
* 210291	05-03-88	13.0	470	5.6	7.88	8.10	< .010	< .010	< .20
210292	05-06-88	12.5	282	.2	--	8.20	.010	< .010	.20
* 210292	05-06-88	12.5	282	.2	--	7.70	.060	< .010	< .20
210293	04-29-88	13.0	225	8.4	6.35	6.90	< .010	< .010	.20
210294	04-22-88	13.0	217	--	8.83	8.70	< .010	< .010	.40
210295	04-21-88	12.5	400	1.4	7.62	7.90	< .010	< .010	.30
210296	04-04-88	13.0	521	.3	7.57	8.10	.040	< .010	< .20
210297	04-21-88	13.0	405	5.2	7.59	8.10	< .010	< .010	< .20
210298	04-04-88	13.0	330	.2	7.90	8.10	< .010	< .010	< .20
210299	04-11-88	13.0	257	.2	7.62	7.90	.010	< .010	< .20
210300	04-26-88	12.5	485	3.7	6.55	6.80	< .010	< .010	.20
210301	04-22-88	13.0	465	--	7.71	8.00	< .010	< .010	.30
210302	03-28-88	12.0	207	5.6	6.93	7.70	< .010	< .010	< .20
210303	03-30-88	12.0	390	.2	7.94	8.00	< .010	.020	< .20
350016	03-22-88	12.0	420	9.3	7.90	8.10	< .010	< .010	< .20
350041	04-04-88	11.5	380	.3	7.34	7.90	.030	< .010	.20
350042	03-22-88	12.0	400	2.9	7.67	8.00	< .010	< .010	< .20

Table 3.--Results of chemical analyses of ground-water samples--Continued

New Jersey well number	Sample date	Nitrogen, NO2+NO3 dissolved (mg/L as N) (00631)	Phosphorous dissolved (mg/L as P) (00666)	Phosphorous ortho, dissolved (mg/L as P) (00671)	Carbon, organic dissolved (mg/L as C) (00681)	Cyanide dissolved (mg/L as Cn) (00723)	Calcium dissolved (mg/L as Ca) (00915)	Magnesium, dissolved (mg/L as Mg) (00925)	Sodium, dissolved (mg/L as Na) (00930)	Potassium, dissolved (mg/L as K) (00935)	Chloride, dissolved (mg/L as Cl) (00940)
190233	04-25-88	1.90	0.050	0.040	0.6	<0.01	22	9.3	9.0	2.1	7.7
190234	03-31-88	< .100	.070	.050	.6	< .01	6.8	2.8	13	2.0	7.8
210090	03-24-88	1.50	.040	.040	.8	< .01	40	18	12	1.2	19
210242	03-23-88	.820	.020	.010	.5	< .01	49	22	37	1.2	28
210250	03-23-88	.210	.040	.030	.1	< .01	40	13	23	2.1	31
210251	03-21-88	.610	.070	.050	--	< .01	34	15	21	1.7	9.7
210265	03-28-88	< .100	< .010	< .010	.4	< .01	44	19	7.8	.90	3.5
210275	03-24-88	3.00	.040	.030	.5	< .01	43	17	12	1.1	17
210277	03-21-88	4.20	.050	.040	.9	< .01	--	--	--	3.1	23
210291	05-03-88	4.10	.040	.030	.4	< .01	54	21	11	1.1	24
* 210291	05-03-88	4.10	.040	.030	.4	< .01	54	21	11	1.1	25
210292	05-06-88	< .100	.040	.100	.3	< .01	25	12	15	2.4	7.9
* 210292	05-06-88	< .100	.040	.100	.4	< .01	25	12	15	2.5	8.0
210293	04-29-88	4.00	.110	.090	.5	< .01	22	5.8	11	.90	12
210294	04-22-88	.120	.010	< .010	.4	< .01	9.0	1.3	36	.20	6.2
210295	04-21-88	1.60	.040	.030	.6	< .01	45	15	11	1.2	22
210296	04-04-88	< .100	.050	.040	.6	< .01	55	14	25	5.5	37
210297	04-21-88	3.60	.030	.030	.4	< .01	43	18	11	1.0	9.6
210298	04-04-88	< .100	.020	.010	.3	< .01	37	15	9.8	.70	4.9
210299	04-11-88	< .100	.030	.020	.2	< .01	32	8.4	6.6	.80	2.7
210300	04-26-88	4.70	.030	.030	1.0	< .01	46	21	16	1.4	44
210301	04-22-88	1.80	.030	.030	.4	< .01	50	20	10	1.3	30
210302	03-28-88	.820	.020	< .010	.4	< .01	27	5.4	5.0	.50	3.7
210303	03-30-88	.450	.010	< .010	.3	< .01	42	18	9.3	1.2	7.0
350016	03-22-88	4.70	.020	.020	.6	< .01	46	19	10	1.2	12
350041	04-04-88	< .100	.040	.060	.5	< .01	39	6.1	26	8.0	4.2
350042	03-22-88	1.40	.020	< .010	.9	< .01	46	16	11	.80	7.0

Table 3.--Results of chemical analyses of ground-water samples--Continued

New Jersey well number	Sample date	Sulfate dissolved (mg/L as SO_4) (00945)	Fluoride, dissolved (mg/L as F) (00950)	Silica, dissolved (mg/L as SiO_2) (00955)	Arsenic, dissolved (µg/L as As) (01000)	Barium, dissolved (µg/L as Ba) (01005)	Beryllium, dissolved (µg/L as Be) (01010)	Boron, dissolved (µg/L as B) (01020)	Cadmium, dissolved (µg/L as Cd) (01025)	Chromium, dissolved (µg/L as Cr) (01030)	Cobalt, dissolved (µg/L as Co) (01035)
190233	04-25-88	20	0.20	47	2	4	<0.5	<10	<1	<5	<3
190234	03-31-88	1.6	.20	40	<1	3	< .5	20	<1	<5	<3
210090	03-24-88	35	.10	23	6	130	< .5	80	<1	<5	<3
210242	03-23-88	87	.20	20	8	110	< .5	220	<1	<5	<3
210250	03-23-88	33	.20	27	3	51	< .5	80	<1	<5	<3
210251	03-21-88	33	.20	35	10	22	< .5	30	<1	<5	<3
210265	03-28-88	22	.10	22	1	110	< .5	10	<1	<5	<3
210275	03-24-88	27	.10	21	4	240	< .5	100	<1	<5	<3
210277	03-21-88	32	.10	--	4	--	--	50	--	--	--
210291	05-03-88	16	.20	21	4	510	< .5	30	<1	<5	<3
* 210291	05-03-88	16	.20	21	4	510	< .5	30	<1	<5	<3
210292	05-06-88	26	.30	27	11	22	< .5	10	<1	<5	<3
* 210292	05-06-88	26	.30	27	11	22	< .5	20	<1	<5	<3
210293	04-29-88	25	.20	27	<1	140	< .5	10	2	<5	<3
210294	04-22-88	17	.20	29	23	<2	< .5	1100	<1	<5	<3
210295	04-21-88	32	.20	26	8	80	< .5	120	<1	<5	<3
210296	04-04-88	41	.20	33	11	37	< .5	20	<1	<5	<3
210297	04-21-88	17	.10	20	5	360	< .5	50	<1	<5	<3
210298	04-04-88	19	.20	23	5	210	< .5	<10	<1	<5	<3
210299	04-11-88	13	.20	25	<1	51	< .5	<10	<1	<5	<3
210300	04-26-88	38	.10	21	3	120	< .5	40	<1	<5	<3
210301	04-22-88	29	.10	18	2	240	< .5	40	<1	<5	<3
210302	03-28-88	25	.10	29	1	<2	< .5	140	<1	<5	<3
210303	03-30-88	15	.20	20	<1	140	< .5	<10	<1	<5	<3
350016	03-22-88	28	.20	18	5	260	< .5	50	<1	<5	<3
350041	04-04-88	18	.20	25	6	17	< .5	10	<1	<5	<3
350042	03-22-88	29	.20	19	5	110	< .5	20	<1	<5	<3

Table 3.--Results of chemical analyses of ground-water samples--Continued

New Jersey well number	Sample date	Copper, dis-solved (μg/L as Cu) (01040)	Iron, dis-solved (μg/L as Fe) (01046)	Lead, dis-solved (μg/L as Pb) (01049)	Manga-nese, dis-solved (μg/L as Mn) (01056)	Molyb-denum, dis-solved (μg/L as Mo) (01060)	Nickel, dis-solved (μg/L as Ni) (01065)	Silver, dis-solved (μg/L as Ag) (01075)	Stron-tium, dis-solved (μg/L as Sr) (01080)	Vana-dium, dis-solved (μg/L as V) (01085)	Zinc, dis-solved (μg/L as Zn) (01090)
190233	04-25-88	<10	3	<10	<1	<10	<10	<1.0	110	7	7
190234	03-31-88	<10	44	<10	5	<10	<10	<1.0	55	<6	<3
210090	03-24-88	<10	<3	<10	<1	<10	<10	<1.0	490	<6	<3
210242	03-23-88	<10	<3	<10	<1	<10	<10	<1.0	2,900	8	<3
210250	03-23-88	<10	3	<10	1	<10	<10	<1.0	360	<6	28
210251	03-21-88	<10	4	<10	<1	<10	<10	<1.0	310	<6	10
210265	03-28-88	<10	140	<10	41	<10	<10	<1.0	470	<6	67
210275	03-24-88	<10	<3	<10	<1	10	<10	<1.0	310	<6	<3
210277	03-21-88	--	--	--	--	--	--	--	--	--	--
210291	05-03-88	<10	<3	<10	<1	<10	<10	<1.0	340	<6	68
* 210291	05-03-88	<10	<3	<10	<1	<10	<10	<1.0	350	<6	69
210292	05-06-88	<10	1,200	<10	340	<10	<10	<1.0	210	<6	100
* 210292	05-06-88	<10	1,200	<10	340	<10	<10	1.0	210	<6	100
210293	04-29-88	<10	14	<10	2	<10	<10	<1.0	73	<6	16
210294	04-22-88	<10	<3	<10	<1	<10	<10	<1.0	5	14	36
210295	04-21-88	<10	<3	<10	<1	<10	<10	<1.0	490	<6	<3
210296	04-04-88	<10	88	<10	140	<10	<10	<1.0	370	<6	58
210297	04-21-88	<10	<3	<10	<1	<10	<10	<1.0	520	<6	<3
210298	04-04-88	<10	<3	<10	7	<10	<10	<1.0	230	<6	<3
210299	04-11-88	<10	260	<10	230	<10	<10	<1.0	72	<6	70
210300	04-26-88	<10	10	<10	<1	<10	<10	<1.0	370	<6	4
210301	04-22-88	<10	5	<10	<1	<10	<10	<1.0	470	<6	39
210302	03-28-88	<10	4	<10	2	<10	<10	<1.0	42	<6	120
210303	03-30-88	<10	10	<10	280	<10	<10	<1.0	270	<6	<3
350016	03-22-88	<10	17	<10	2	30	<10	<1.0	1,600	<6	<3
350041	04-04-88	<10	240	10	220	<10	<10	<1.0	250	<6	56
350042	03-22-88	<10	5	<10	<1	<10	<10	<1.0	700	<6	<3

Table 3.--Results of chemical analyses of ground-water samples--Continued

New Jersey well number	Sample date	Aluminum, dissolved (µg/L as Al) (01106)	Lithium, dissolved (µg/L as Li) (01130)	Selenium, dissolved (µg/L as Se) (01145)	Dichlorobromomethane, total (µg/L) (32101)	Carbontetrachloride, total (µg/L) (32102)	1,2-Dichloroethane, total (µg/L) (32103)	Bromoform, total (µg/L) (32104)	Chlorodibromomethane, total (µg/L) (32105)	Chloroform, total (µg/L) (32106)	Phenols, total (µg/L) (32730)
190233	04-25-88	<10	<4	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1
190234	03-31-88	<10	8	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--
210090	03-24-88	<10	20	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	1
210242	03-23-88	<10	22	<1	--	--	--	--	--	--	3
210250	03-23-88	<10	23	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	4
210251	03-21-88	<10	12	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--
210265	03-28-88	<10	7	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	3
210275	03-24-88	<10	20	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	3
210277	03-21-88	--	--	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	4
210291	05-03-88	<10	17	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1
* 210291	05-03-88	<10	17	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1
210292	05-06-88	<10	14	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	3
* 210292	05-06-88	<10	15	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	2
210293	04-29-88	<10	7	1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1
210294	04-22-88	<10	6	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	2
210295	04-21-88	<10	18	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1
210296	04-04-88	10	20	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--
210297	04-21-88	<10	13	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	4
210298	04-04-88	<10	8	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--
210299	04-11-88	<10	5	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--
210300	04-26-88	20	9	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1
210301	04-22-88	<10	6	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1
210302	03-28-88	<10	8	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	4
210303	03-30-88	<10	10	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1
350016	03-22-88	<10	38	1	--	--	--	--	--	--	4
350041	04-04-88	<10	20	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1
350042	03-22-88	<10	20	<1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	3

Table 3.--Results of chemical analyses of ground-water samples--Continued

New Jersey well number	Sample date	Toluene, total (μg/L) (34010)	Benzene, total (μg/L) (34030)	Chloro-benzene, total (μg/L) (34301)	Chloro-ethane, total (μg/L) (34311)	Ethyl-benzene, total (μg/L) (34371)	Methyl-bromide, total (μg/L) (34413)	Methyl-chlo-ride, total (μg/L) (34418)	Methyl-ene chlo-ride, total (μg/L) (34423)	Tetra-chloro-ethyl-ene, total (μg/L) (34475)	Tri-chloro-fluoro-methane, total (μg/L) (34488)
190233	04-25-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
190234	03-31-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210090	03-24-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210242	03-23-88	--	--	--	--	--	--	--	--	--	--
210250	03-23-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210251	03-21-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210265	03-28-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210275	03-24-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0
210277	03-21-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	12	<3.0
210291	05-03-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
* 210291	05-03-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210292	05-06-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
* 210292	05-06-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210293	04-29-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210294	04-22-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210295	04-21-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210296	04-04-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210297	04-21-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210298	04-04-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210299	04-11-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210300	04-26-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210301	04-22-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210302	03-28-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210303	03-30-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
350016	03-22-88	--	--	--	--	--	--	--	--	--	--
350041	04-04-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
350042	03-22-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Table 3.--Results of chemical analyses of ground-water samples--Continued

New Jersey well number	Sample date	1,1-Dichloroethane, total (µg/L) (34496)	1,1-Dichloroethylene, total (µg/L) (34501)	1,1,1-Trichloroethane, total (µg/L) (34506)	1,1,2-Trichloroethane, total (µg/L) (34511)	1,1,2,2 Tetrachloroethane, total (µg/L) (34516)	1,2-Dichlorobenzene, total (µg/L) (34536)	1,2-Dichloropropane, total (µg/L) (34541)	1,2-Transdichloroethene, total (µg/L) (34546)	1,3-Dichloropropene, total (µg/L) (34561)
190233	04-25-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
190234	03-31-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210090	03-24-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210242	03-23-88	--	--	--	--	--	--	--	--	--
210250	03-23-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210251	03-21-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210265	03-28-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210275	03-24-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210277	03-21-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210291	05-03-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
* 210291	05-03-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210292	05-06-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
* 210292	05-06-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210293	04-29-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210294	04-22-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210295	04-21-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210296	04-04-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210297	04-21-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210298	04-04-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210299	04-11-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210300	04-26-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210301	04-22-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210302	03-28-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210303	03-30-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
350016	03-22-88	--	--	--	--	--	--	--	--	--
350041	04-04-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
350042	03-22-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Table 3.--Results of chemical analyses of ground-water samples--Continued

New Jersey well number	Sample date	1,3-Di-chloro-benzene, total (µg/L) (34566)	1,4-Di-chloro-benzene, total (µg/L) (34571)	2-Chloro-ethyl-vinyl-ether, total (µg/L) (34576)	Di-chloro-di-fluoro-methane, total (µg/L) (34668)	Trans-1,3-di-chloro-propene, total (µg/L) (34699)	Cis 1,3-di-chloro-propene, total (µg/L) (34704)	1,2-Dibromo ethyl-ene, total (µg/L) (39082)	Vinyl chlo-ride, total (µg/L) (39175)	Tri-chloro-ethyl-ene, total (µg/L) (39180)
190233	04-25-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0
190234	03-31-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210090	03-24-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210242	03-23-88	--	--	--	--	--	--	--	--	--
210250	03-23-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210251	03-21-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210265	03-28-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210275	03-24-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210277	03-21-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210291	05-03-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
* 210291	05-03-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210292	05-06-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
* 210292	05-06-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210293	04-29-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210294	04-22-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0
210295	04-21-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0
210296	04-04-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210297	04-21-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0
210298	04-04-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210299	04-11-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210300	04-26-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0
210301	04-22-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0
210302	03-28-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
210303	03-30-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
350016	03-22-88	--	--	--	--	--	--	--	--	--
350041	04-04-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
350042	03-22-88	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Table 3.--Results of chemical analyses of ground-water samples--Continued

New Jersey well number	Sample date	Solids, residue at 180 deg. C dis-solved (µg/L) (70300)	Mercury dis-solved (µg/L as HG) (71890)	Altitude of land surface datum (feet above NGVD) (72000)	Depth of well, total (feet) (72008)	Styrene, total (µg/L) (77128)	Xylene, total whole water tot rec (µg/L) (81551)	Spe-cific con-duct-ance lab (µS/cm) (90095)	Alka-linity lab (mg/L as CACO3) (90410)
190233	04-25-88	165	<0.1	370	100	<3.0	<3.0	236	79
190234	03-31-88	96	< .1	470	100	<3.0	<3.0	118	46
210090	03-24-88	231	< .1	140	400	<3.0	<3.0	388	131
210242	03-23-88	342	< .1	157	600	--	--	562	155
210250	03-23-88	228	< .1	205	400	<3.0	<3.0	390	125
210251	03-21-88	236	.4	125	223	<3.0	<3.0	375	147
210265	03-28-88	216	< .1	355	275	<3.0	<3.0	379	179
210275	03-24-88	228	< .1	200	300	<3.0	<3.0	387	138
210277	03-21-88	264	< .1	200	380	<3.0	<3.0	445	149
210291	05-03-88	269	< .1	210	200	<3.0	<3.0	466	179
* 210291	05-03-88	271	< .1	210	200	<3.0	<3.0	468	177
210292	05-06-88	175	< .1	310	175	<3.0	<3.0	281	112
* 210292	05-06-88	170	< .1	310	175	<3.0	<3.0	283	112
210293	04-29-88	149	< .1	110	305	<3.0	<3.0	227	49
210294	04-22-88	151	< .1	270	220	<3.0	<3.0	220	85
210295	04-21-88	239	< .1	140	130	<3.0	<3.0	398	130
210296	04-04-88	304	< .1	430	250	<3.0	<3.0	499	156
210297	04-21-88	222	< .1	150	205	<3.0	<3.0	394	164
210298	04-04-88	188	< .1	186	175	<3.0	<3.0	320	147
210299	04-11-88	156	< .1	250	215	<3.0	<3.0	247	115
210300	04-26-88	273	< .1	220	135	<3.0	<3.0	481	119
210301	04-22-88	251	< .1	170	200	<3.0	<3.0	441	150
210302	03-28-88	138	< .1	343	290	<3.0	<3.0	204	68
210303	03-30-88	191	< .1	350	115	<3.0	<3.0	375	171
350016	03-22-88	234	< .1	105	300	--	--	399	151
350041	04-04-88	221	< .1	357	200	<3.0	<3.0	363	169
350042	03-22-88	208	< .1	170		<3.0	<3.0	383	164

Table 4.--Discharge and drainage area at surface-water measurement sites on Jacobs Creek, Stony Brook, and Beden Brook

[mi^2, square miles; ft^3/s, cubic feet per second; $(ft^3/s)/mi^2$, cubic feet per second per square mile; trib, tributary; NJ, New Jersey; *, Operated as continuous-record gaging station]

Station number	Station name	Drainage area (mi^2)	Date of Measurement	Discharge (ft^3/s)	Runoff ($(ft^3/s)/mi^2$)
01400870	Stony Brook trib 3 near Hopewell, NJ	2.60	08/14/87 11/20/87	0.25 1.25	0.09 .48
01400880	Stony Brook, 0.5 miles downstream of Camp Harmony, NJ	15.2	08/14/87 11/19/87	.73 7.38	.05 .48
01400900	Stony Brook at Glenmoore, NJ	17.0	08/13/87 11/19/87	1.98 7.30	.12 .43
01400907	Stony Brook Branch at NJ Route 31 at Marshalls Corner, NJ	1.00	08/13/87 11/19/87	.42 .58	.44 .58
01400910	Stony Brook Branch at Marshalls Corner, NJ	1.46	08/14/87 11/19/87	.23 1.79	.16 1.23
01400920	Stony Brook above Baldwins Creek near Pennington, NJ	23.5	08/14/87 11/20/87	2.75 11.3	.12 .48
01400923	Baldwins Creek at Baldwin State Park at Pennington, NJ	.58	08/13/87 11/20/87	.05 .27	.09 .47
01400925	Baldwins Creek at Yards Road at Pennington, NJ	1.07	08/13/87 11/20/87	.62 .68	.58 .64
01400927	Baldwins Creek trib 0.1 mile upstream of NJ Route 31 at Pennington NJ	.43	08/13/87 11/20/87	.21 .30	.49 .69
01400930	Baldwins Creek at Pennington, NJ	1.99	08/13/87 11/20/87	1.03 1.21	.52 .61
01400932	Baldwins Creek at Baldwin Lake near Pennington, NJ	2.52	08/14/87 11/20/87	.86 1.82	.34 .72
01400936	Lewis Brook at Main Street at Pennington, NJ	.32	08/13/87 11/19/87	.22 .29	.69 .91
01400938	Lewis Brook at Pennington, NJ	.53	08/13/87 11/19/87	.35 .86	.66 1.62
01400939	Lewis Brook trib at Pennington, NJ	.08	08/13/87 11/19/87	.02 .05	.25 .63
01400940	Stony Brook at Mt. Rose Road at Pennington, NJ	25.1	08/14/87 11/19/87	3.82 13.8	.15 .55
01400941	Stony Brook trib 4 at Pennington, NJ	.32	08/13/87 11/19/87	.10 .23	.31 .72
01400942	Stony Brook trib 5 at Baldwins Corner, NJ	.81	08/13/87 11/19/87	.23 .45	.28 .55
01400944	Stony Brook trib 5 trib at Oak Street at Pennington, NJ	.17	08/13/87 11/19/87	.11 .23	.65 1.35
01400945	Stony Brook trib 5 at Pennington, NJ	1.62	08/13/87 11/19/87	.51 .89	.31 .55
01400947	Stony Brook at Pennington, NJ	26.7	08/13/87 11/19/87	5.32 17.0	.20 .64
01400950	Hart Brook near Pennington, NJ	.57	08/14/87 11/19/87	.05 .43	.09 .75
01400951	Hart Brook near Rosedale, NJ	1.25	08/14/87 11/20/87	.15 .96	.12 .77

Table 4.--Discharge and drainage area at surface-water measurement sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Station name	Drainage area (mi^2)	Date of Measurement	Discharge (ft^3/s)	Runoff $(ft^3/s)/mi^2$
01400952	Stony Brook trib 2 near Rosedale, NJ	0.49	08/14/87 11/20/87	0.04 .44	0.08 .90
01400953	Honey Branch near Pennington, NJ	.70	08/13/87 11/19/87	.02 .43	.03 .61
01400960	Honey Branch near Mount Rose, NJ	1.28	08/13/87 11/19/87	.18 .77	.14 .60
01400962	Honey Branch Trib near Pennington, NJ	.58	08/13/87 11/19/87	.19 .17	.33 .29
01400970	Honey Branch near Rosedale, NJ	3.83	08/13/87 11/19/87	.18 3.11	.05 .81
01400974	Stony Brook at Rosedale, NJ	34.2	08/14/87 11/19/87	5.60 21.0	.16 .61
01400978	Cleveland Brook near Rosedale, NJ	.41	08/13/87 11/19/87	.09 .17	.22 .41
01400985	Stony Brook at Province Line Road near Princeton, NJ	36.2	08/13/87 11/19/87	7.45 28.4	.21 .78
01400990	Palmer Lake outlet stream at Elm Road at Princeton, NJ	2.18	08/13/87 11/19/87	.20 1.55	.09 .71
01400998	Stony Brook trib 6 near Princeton, NJ	1.35	08/13/87 11/19/87	.22 1.06	.16 .79
* 01401000	Stony Brook at Princeton, NJ	44.5	08/13/87 11/20/87	12.8 29	.28 .58
01401100	Stony Brook at Clarksville, NJ	46.5	08/13/87 11/19/87	14.8 35.0	.31 .75
01401510	Beden Brook at Louellen Avenue at Hopewell, NJ	0.55	08/14/87 11/19/87	.04 .06	.07 .11
01401513	Beden Brook at Hopewell, NJ	1.91	08/14/87 11/20/87	.28 1.25	.15 .65
01401515	Beden Brook trib at first bridge upstream of railroad at Hopewell, NJ	2.66	08/14/87 11/20/87	.42 1.63	.16 .61
01401517	Beden Brook trib at Hopewell, NJ	4.3	08/14/87 11/20/87	.76 2.46	.18 .57
01401518	Beden Brook trib 2 at Hopewell, NJ	.32	08/14/87 11/20/87	.03 .17	.09 .53
01401520	Beden Brook near Hopewell, NJ	6.67	08/14/87 11/20/87	1.44 4.12	.21 .62
01401525	Beden Brook at Province Line Road at Stoutsburg, NJ	7.84	08/14/87 11/20/87	1.68 4.57	.21 .58
01401530	Beden Brook at Great Road near Blawenburg, NJ	11.8	08/13/87 11/20/87	4.08 8.16	.35 .69
01401535	Beden Brook near Blawenburg, NJ	15.3	08/13/87 11/19/87	5.47 11.1	.36 .73
01401540	Rock Brook near Hopewell, NJ	3.84	08/13/87 11/19/87	.07 .20	.02 .05
01401590	Rock Brook at Blawenburg, NJ	8.0	08/13/87 11/19/87	2.60 6.66	.33 .83
01401595	Rock Brook near Blawenburg, NJ	9.03	08/13/87 11/19/87	3.69 7.16	.41 .79

Table 4.--Discharge and drainage area at surface-water measurement sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Station name	Drainage area (mi^2)	Date of Measurement	Discharge (ft^3/s)	Runoff $(ft^3/s)/mi^2$
01401600	Beden Brook near Rocky Hill, NJ	27.6	08/13/87 11/19/87	11.8 22.0	0.43 .80
01462730	Jacobs Creek at Woosamonsa Road near Harbourton, NJ	1.84	08/13/87 11/19/87	.31 1.06	.17 .58
01462733	Jacobs Creek at Ackors Corner, NJ	2.04	08/13/87 11/19/87	.71 1.82	.35 .89
01462734	Jacobs Creek trib at Ackors Corner, NJ	.47	08/13/87	.14	.29
01462737	Jacobs Creek at Scotch Road at Bear Tavern, NJ	4.30	08/13/87 11/19/87	1.46 2.83	.34 .66
01462740	Jacobs Creek above Woolsey Brook at Bear Tavern, NJ	5.53	08/14/87 11/20/87	1.41 4.22	.25 .76
01462742	Woolsey Brook at Pennington, NJ	.16	08/14/87 11/20/87	.02 .13	.13 .83
01462744	Woolsey Brook trib at Pennington, NJ	.32	08/14/87 11/20/87	.10 .34	.33 1.07
01462745	Woolsey Brook trib 2 at mouth near Pennington, NJ	.46	08/13/87 11/19/87	.11 .14	.24 .30
01462747	Woolsey Brook at Scotch Road near Pennington, NJ	1.37	08/13/87 11/19/87	.63 .84	.46 .61
01462750	Woolsey Brook at Bear Tavern, NJ	2.13	08/13/87 11/19/87	.89 1.76	.41 .83
01462755	Woolsey Brook trib 3 at Bear Tavern, NJ	.89	08/14/87 11/19/87	.09 .78	.10 .88
01462760	Jacobs Creek near Washington Crossing, NJ	10.0	08/14/87 11/20/87	2.63 8.36	.26 .84
01462765	Ewing Creek at Scotch Road near West Trenton, NJ	1.24	08/13/87 11/20/87	.32 .94	.26 .76
01462770	Ewing Creek at Nursery Road near West Trenton, NJ	2.29	08/14/87 11/20/87	.75 2.22	.33 .97
01462775	Ewing Creek at Jacobs Creek Road near West Trenton, NJ	2.65	08/14/87 11/20/87	.92 2.28	.35 .86
01462800	Jacobs Creek at Somerset, NJ	13.3	08/13/87 11/20/87	5.54 11.6	.42 .87

Table 5.--Location, drainage area, and periods of record for streamflow-measurement sites on Jacobs Creek, Stony Brook, and Beden Brook

[trib, tributary; STP, sewage-treatment plant; lat, latitude; Long, longitude; mi, miles; mi^2, square miles; ft, feet]

Station number	Station name	Location	Drainage area (mi^2)	Streamflow-measurement period of record
01400840	Stony Brook at Linvale Road, N.J.	Lat 40°23'40", long 74°50'10", Hunterdon County, hydrologic unit 02030105, at bridge on Linvale Road, 4 mi west of Hopewell, 0.1 mi north of intersection of State Route 31 and Linvale Road, and 0.3 mi south of Snydertown.	2.21	1988
01400870	Stony Brook trib 3 near Hopewell, N.J.	Lat 40°24'12", long 74°48'07", Mercer County, hydrologic unit 02030105, at bridge on Van Dyke Road, 0.2 mi east of Stony Brook Road and 2.0 mi northwest of Hopewell.	2.60	1970, 1987
01400880	Stony Brook, 0.5 miles downstream of Camp Harmony, N.J.	Lat 40°22'53", long 74°48'11", Mercer County, hydrologic unit 02030105, downstream of unnamed tributary, 0.8 mi and 1.4 mi east of Woodsville.	15.2	1985-87
01400900	Stony Brook at Glenmoore, N.J.	Lat 40°21'55", long 74°47'15", Mercer County, hydrologic unit 02030105, at bridge on Pennington-Hopewell Road (State Route 518 Spur), at Glenmoore, at entrance to Hopewell Valley Country Club, 0.3 mi downstream of unnamed tributary and 2.6 mi north of Pennington.	17.0	1957-62, 1964, 1969-71, 1985-88
01400907	Stony Brook Branch at Route 31 at Marshalls Corners, N.J.	Lat 40°21'33", long 74°47'56", Mercer County, hydrologic unit 02030105, at bridge on State Route 31, and 2.2 mi north of Pennington 1.0 mi upstream of mouth.	1.00	1987
01400910	Stony Brook Branch at Marshalls Corner, N.J.	Lat 40°21'07", long 74°47'04", Mercer County, hydrologic unit 02030105, 1,000 ft upstream from Titus Mill Road, at mouth, 1.7 mi north of Pennington and 1.8 mi east of State Route 31	1.46	1985-87
01400913	Stony Brook at Titus Mill Road near Glenmoore, N.J.	Lat 40°20'57", Long 74°46'56", Mercer County, hydrologic unit 02030105, 1.5 mi northeast of Pennington, 1.0 mi south of Glenmoore, and 0.8 mi east of intersection of State Route 31 and Titus Mill Road	18.87	1988
01400920	Stony Brook above Baldwin Creek near Pennington, N.J.	Lat 40°20'21", long 74°46'42", Mercer County, hydrologic unit 02030105, 250 ft upstream from confluence with Baldwin Creek in Hopewell Township, and 1.1 mi northwest of intersection of East Delaware Avenue and Main Street in Pennington Borough.	23.5	1963, 1971-72, 1985-87
01400923	Baldwin Creek at Baldwin St Park at Pennington, N.J.	Lat 40°20'26", long 74°48'38", Mercer County, hydrologic unit 02030105, at bridge on unimproved road, 0.1 mi north of Yard Road, 0.2 mi upstream of unnamed tributary and 1.3 mi northwest of Pennington.	.58	1985-87
01400925	Baldwin Creek at Yards Road at Pennington, N.J.	Lat 40°20'21", long 74°48'07", Mercer County, hydrologic unit 02030105, at bridge on Yard Road, 200 ft upstream of unnamed tributary, 0.3 mi west of State Route 31 and 1.0 mi north of Pennington.	1.07	1985-87

Table 5.--Location, drainage area, and periods of record for streamflow-measurement sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Station name	Location	Drainage area (mi^2)	Streamflow-measurement period of record
01400927	Baldwin Creek trib .1 mi upstream of State Route 31 at Pennington, N.J.	Lat 40°20'15", long 74°47'56", Mercer County, hydrologic unit 02030105, 450 ft upstream of bridge on State Route 31, 0.2 mi south of Yard Road, 0.4 mi north of Pleasant Valley Road and 0.8 mi from Pennington.	0.43	1985-87
01400930	Baldwin Creek at Pennington, N.J.	Lat 40°20'18", long 74°47'50", Mercer County, hydrologic unit 02030105, at bridge on State Route 31, 450 ft downstream of unnamed tributary, 0.4 mi north of Pleasant Valley Road and 0.8 mi from Pennington.	1.99	1957-59, 1963, 1965-69, 1972, 1985-88
01400932	Baldwin Creek at Baldwin Lake near Pennington, N.J.	Lat 40°20'26", long 74°46'48", Mercer County, hydrologic unit 02030105, downstream from earthfill dam at Baldwin Lake, 1,000 ft upstream from mouth, and 1.1 mi northeast of Pennington.	2.52	1962-70, 1985-87
01400936	Lewis Brook at Main Street at Pennington, N.J.	Lat 40°19'53", long 74°47'33", Mercer County, hydrologic unit 02030105, at bridge on North Main Street, 0.2 mi north of Delaware Avenue at Brookside Avenue, one street south of Franklin Avenue at Pennington and 0.6 mi upstream of mouth.	.32	1985-87
01400938	Lewis Brook at Pennington, N.J.	Lat 40°20'02", long 74°46'58", Mercer County, hydrologic unit 02030105, 200 ft upstream from mouth, 0.3 mi northeast of intersection of King George and Mount Rose Roads in Pennington.	.53	1971-72, 1985-87
01400939	Lewis Brook trib at Pennington, N.J.	Lat 40°20'00", long 74°46'57", Mercer County, hydrologic unit 02030105, 100 ft upstream from mouth and 0.3 mi northeast of intersection of King George Road and Mount Rose Road in Pennington.	.08	1971-72, 1985-87
01400940	Stony Brook at Mount Rose road at Pennington, N.J.	Lat 40°19'55", long 74°46'39", Mercer County, hydrologic unit 02030105, at bridge on Mount Rose Road (Pennington-Rocky Hill Road), 100 ft east of King George Road, 100 ft upstream of unnamed tributary and 1.2 mi east of Pennington.	25.1	1985-87
01400941	Stony Brook trib 4 at Pennington, N.J.	Lat 40°19'52", long 74°46'42", Mercer County, hydrologic unit 02030105, 100 ft upstream from mouth near Mount Rose Road at Pennington, 0.2 mi downstream from Federal City Road.	.32	1971-72, 1985-87
01400942	Stony Brook trib 5 at Baldwins Corner, N.J.	Lat 40°18'49", long 74°47'09", Mercer County, hydrologic unit 02030105, at bridge on Pennington-Lawrenceville Road at Baldwins Corner, 1.0 mi south of Pennington and 1.5 mi upstream from mouth.	.81	1985-87
01400944	Stony Brook trib 5 at Oak Street at Pennington, N.J.	Lat 40°19'14", long 74°46'45", Mercer County, hydrologic unit 02030105, at north end of Oak Street, 400 ft upstream of unnamed lake and 0.7 mi south of Pennington.	.17	1985-87

Table 5.--Location, drainage area, and periods of record for streamflow-measurement sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Station name	Location	Drainage area (mi^2)	Streamflow-measurement period of record
01400945	Stony Brook trib 5 at Pennington, N.J.	Lat 40°19'43", long 74°46'12", Mercer County, hydrologic unit 02030105, at bridge on Federal City Road, east of Pennington, and 0.1 mi upstream from mouth.	1.62	1985-87
01400947	Stony Brook at Pennington, N.J.	Lat 40°19'50", long 74°46'05", Mercer County, hydrologic unit 02030105, 25 ft upstream from dam on Stony Brook at Old Mill Road, 1.3 mi east of Pennington and 1.4 mi downstream from Baldwin Creek.	26.7	1965-69, 1971-72, 1985-88
01400950	Hart Brook near Pennington, N.J.	Lat 40°19'17", long 74°45'38", Mercer County, hydrologic unit 02030105, at culvert on Federal City Road, 1.0 mi upstream from mouth and 1.7 mi southeast of Pennington.	.57	1985-87
01400951	Hart Brook near Rosedale, N.J.	Lat 40°19'58", long 74°45'18", Mercer County, hydrologic unit 02030105, 0.2 mi upstream from Stony Brook, 0.6 mi downstream from Blackwells Road, 1.9 mi east of Pennington, and 1.9 mi southwest of Rosedale.	1.25	1965, 1985-87
01400952	Stony Brook trib 2 near Rosedale, N.J.	Lat 40°20'08", long 74°44'48", Mercer County, hydrologic unit 02030105, 0.3 mi upstream of Honey Branch, 1.3 mi west of Rosedale, and 2.4 mi east of Pennington.	.49	1965, 1985-87
01400953	Honey Branch near Pennington, N.J.	Lat 40°21'27", long 74°45'58", Mercer County, hydrologic unit 02030105, at bridge on Wargo Road, 0.5 mi upstream of Pennington-Rocky Hill Road and 0.8 mi north of Centerville.	.70	1985-87
01400960	Honey Branch near Mount Rose, N.J.	Lat 40°21'17", long 74°45'29", Mercer County, hydrologic unit 02030105, at bridge on Mount Rose Road, 0.6 mi northeast of Centerville, 1.4 mi southeast of Mount Rose and 2.5 mi northeast of Pennington.	1.28	1985-87
01400962	Honey Branch trib near Pennington, N.J.	Lat 40°21'22", long 74°45'22", Mercer County, hydrologic unit 02030105, at bridge on Bayberry Road (formerly Van Kirk Road), 0.1 above mouth, and 2.7 mi northeast of Pennington.	.58	1965, 1968-69, 1985-87
01400970	Honey Branch near Rosedale, N.J.	Lat 40°20'26", long 74°44'39", Mercer County, hydrologic unit 02030105, at bridge on Elm Ridge Road, 0.2 mi above mouth, and 1.2 mi west of Rosedale.	3.83	1957-59, 1968-73, 1975, 1985-88
01400974	Stony Brook at Rosedale, N.J.	Lat 40°20'35", long 74°43'33", Mercer County, hydrologic unit 02030105, at bridge on Carter Road in Rosedale, 1.2 mi downstream from Honey Branch.	34.2	1965, 1971-72, 1985-87
01400978	Cleveland Brook near Rosedale, N.J.	Lat 40°21'25", long 74°43'52", Mercer County, hydrologic unit 02030105, 800 ft upstream from Cleveland Brook Road, 1.4 mi north of Rosedale and 1.8 mi upstream of mouth	.41	1985-87

Table 5.--Location, drainage area, and periods of record for streamflow-measurement sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Station name	Location	Drainage area (mi^2)	Streamflow-measurement period of record
01400985	Stony Brook at Province Line Road near Princeton, N.J.	Lat 40°21'09", long 74°42'39", Mercer County, hydrologic unit 02030105, at bridge on Province Line Road, 0.6 mi downstream of Cleveland Brook and 1.2 mi northeast of Rosedale.	36.2	1985-87
01400990	Palmer lake outlet stream at Elm Road at Princeton, N.J.	Lat 40°21'16", long 74°40'52", Mercer County, hydrologic unit 02030105, at bridge on Elm Road at Princeton, 0.6 mi downstream of Palmer Lake and 0.6 mi upstream of mouth.	2.18	1987
01400998	Stony Brook trib 6 near Princeton, N.J.	Lat 40°20'03", long 74°41'25", Mercer County, hydrologic unit 02030105, at bridge on private estate, 0.6 mi north of Coxs Corner and 1.8 mi southwest of Princeton, 300 ft upstream of mouth.	1.35	1987
01401000	Stony Brook at Princeton, N.J.	Lat 40°19'59", Long 74°40'56", Mercer County, hydrologic unit 02030105, at bridge on U.S. Highway 206, 1.6 mi southwest of Princeton, and 4.0 mi upstream from Carnegie Lake.	44.5	1953-Present
01401100	Stony Brook at Clarksville, N.J.	Lat 40°18'34", long 74°40'52", Mercer County, hydrologic unit 02030105, at bridge on State Route 533 (Quaker Road) 600 ft upstream of Duck Pond Run, 0.9 mi north of Clarksville and 2.7 mi southwest of Penns Neck.	46.5	1959-62, 1964, 1988
01401510	Beden Brook at Louellen Avenue at Hopewell, N.J.	Lat 40°23'12", long, 74°46'00", Mercer County, hydrologic unit 02030105, at bridge on Louellen Avenue at Hopewell, 400 ft west of West Broad Street and 1.1 mi upstream from Hopewell-Princeton Road (State Route 569).	.55	1985, 1987
01401513	Beden Brook at Hopewell, N.J.	Lat 40°23'01", long 74°44'40", Somerset County, hydrologic unit 02030105, 1200 ft upstream from Aunt Molly Road, 0.9 mi southeast of Hopewell, and 2.8 mi southwest of Blawenburg.	1.91	1965, 1985, 1987
01401515	Beden Brook trib at first bridge upstream of railroad at Hopewell, N.J.	Lat 40°23'58", long 74°45'16", Mercer County, hydrologic unit 02030105, at bridge on dead end road, 0.1 mi west of Hopewell-Amwell Road, 0.85 mi northeast of Hopewell and 1.4 mi upstream of mouth.	2.66	1985, 1987
01401517	Beden Brook trib at Hopewell, N.J.	Lat 40°23'02", long 74°44'38", Somerset County, hydrologic unit 02030105, at left bank, 900 ft upstream from Aunt Molly Road, 1.0 mi southeast of Hopewell, and 2.7 mi southwest of Blawenburg.	4.3	1965, 1985, 1987
01401518	Beden Brook trib 2 at Hopewell, N.J.	Lat 40°23'01", long 74°44'32" Somerset County, hydrologic unit 02030105, at right bank, 200 ft upstream from Aunt Molly Road, 1.0 mi southeast of Hopewell, and 2.6 mi southwest of Blawenburg.	.32	1965, 1985, 1987
01401520	Beden Brook near Hopewell, N.J.	Lat 40°23'02", long 74°44'28", Mercer County, hydrologic unit 02030105, at bridge on Aunt Molly Road, 0.8 mi upstream from Province Line Road and 1.2 mi east of Hopewell.	6.67	1965, 1987-88

Table 5.--Location, drainage area, and periods of record for streamflow-measurement sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Station name	Location	Drainage area (mi^2)	Streamflow-measurement period of record
01401521	Beden Brook downstream of STP at Stoutsburg, N.J.	Lat 40°23'05", long 74°44'17", Mercer County, hydrologic unit 02030105, 1.5 mi east of Hopewell, 1.0 mi south of Stoutsburg, and 900 ft downstream of Aunt Molly Road.	6.73	No streamflow measurements
01401525	Beden Brook near Hopewell, N.J.	Lat 40°23'25", long 74°43'52", Mercer County, hydrologic unit 02030105, at bridge on Province Line Road, 900 ft upstream of unnamed trib and 0.6 mi south of Stoutsburg.	7.84	1985, 1987
01401530	Beden Brook at Great Road near Blawenburg, N.J.	Lat 40°23'40", long 74°42'05", Somerset County, hydrologic unit 02030105, at bridge on Great Road, 0.9 mi south of Blawenburg, and 2.4 mi upstream of Rock Brook.	11.8	1987
01401535	Beden Brook near Blawenburg, N.J.	Lat 40°24'20", long 74°40'44", Somerset County, hydrologic unit 02030105, at bridge on County Route 518 (Georgetown-Franklin Turnpike), 0.5 mi upstream of Rock Brook and 1.3 mi east of Blawenburg.	15.3	1987
01401540	Rock Brook near Amwell, N.J.	Lat 40°26'44", long 74°44'52", Somerset County, hydrologic unit 02030105, at bridge on Montgomery Road, 0.3 mi north of Amwell, 0.5 mi upstream of Cat Tail Brook and 4.2 mi north of Hopewell.	3.84	1987
01401545	Beden Brook upstream of Rock Brook near Blawenburg, N.J.	Lat 40°24'37", Long 74°40'26", Somerset County, hydrologic unit 02030105, 0.4 miles downstream of County Route 518, 1.5 miles east of Blawenburg, 1.5 miles west of Rocky Hill.	16.0	1988
01401590	Rock Brook at Blawenberg, N.J.	Lat 40°24'40", long 74°42'10", Somerset County, hydrologic unit 02030105, at bridge on Great Road, 0.3 mi north of Blawenburg, 1.7 mi upstream of mouth and 3.7 mi west of Rocky Hill.	8.02	1962-67, 1971-72, 1987-88
01401595	Rock Brook near Blawenberg, N.J.	Lat 40°24'47", long 74°41'05", Somerset County, hydrologic unit 02030105, at bridge on Burnt Hill Road, 0.7 mi upstream from mouth, 1.0 mi northeast of Blawenberg, and 2.8 mi northwest of Rocky Hill.	9.03	1967-88
01401596	Rock Brook at mouth near Blawenburg, N.J.	Lat 40°24'40", long 74°40'30", Somerset County, hydrologic unit 02030105, 0.6 miles downstream of Burnt Hill Rd., 1.5 miles east of Blawenburg, 1.5 miles west of Rocky Hill.	9.49	1988
01401600	Beden Brook near Rocky Hill, N.J.	Lat 40°24'52", long 74°39'02", Somerset County, hydrologic unit 02030105, at bridge on U.S. Route 206 and State Route 533, 0.7 mi upstream from Pike Run, 1.2 mi northwest of Rocky Hill and 4.6 mi north of Princeton.	27.6	1959-63, 1965-67, 1971-72, 1977, 1979-83, 1986-88
01462730	Jacobs Creek at Woosamonsa road near Harbourton, N.J.	Lat 40°20'27", long 74°50'19", Mercer County, hydrologic unit 02040105, at bridge on Woosamonsa Road, 0.7 mi upstream of bridge on Pleasant Valley Road, 1.1 mi south of Harbourton and 2.6 mi northwest of Pennington.	1.84	1987

Table 5.--Location, drainage area, and periods of record for streamflow-measurement sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Station name	Location	Drainage area (mi^2)	Streamflow-measurement period of record
01462733	Jacobs Creek at Ackors Corner, N.J.	Lat 40°19'53", long 74°50'11", Mercer County, hydrologic unit 02040105, at bridge on Pennington-Harbourton Road, 500 ft upstream of unnamed trib, 0.8 mi east of State Route 579 at Ackors Corner and 2.2 mi upstream of Woolsey Brook.	2.04	1985-87
01462734	Jacobs Creek trib at Ackors Corner, N.J.	Lat 40°19'50", long 74°49'54", Mercer County, hydrologic unit 02040105, at bridge on Pleasant Valley Road, 0.9 mi east of State Route 579 at Ackors Corner, and 0.25 mi upstream of Jacobs Creek.	.47	1987
01462737	Jacobs Creek at Scotch Road at Bear Tavern, N.J.	Lat 40°19'07", long 74°50'18", Mercer County, hydrologic unit 02040105, at bridge on Pennington-Titusville Road, 0.8 mi east of Bear Tavern Road (State Route 579) 1.3 mi upstream of Woolsey Brook and 2.6 mi west of Pennington.	4.30	1985-87
01462739	Jacobs Creek at Washington Crossing-Pennington Road at Bear Tavern, N.J.	Lat 40°18'25", long 74°50'03", Mercer County, hydrologic unit 02040105, at bridge on State Route 546, 0.8 mi east of Bear Tavern Road (State Route 579), 0.35 mi upstream of Woolsey Brook and 2.7 mi west of Pennington.	5.16	No streamflow measurements
01462740	Jacobs Creek above Woolsey Brook at Bear Tavern, N.J.	Lat 40°18'07", long 74°50'00", Mercer County, hydrologic unit 02040105, just upstream of Woolsey Brook, 0.4 mi downstream of Pennington Road (State Route 546) and on right side of Jacobs Creek Road, 0.5 mi south of Pennington Road and 1.0 mi southeast of Bear Tavern.	5.53	1985-87
01462742	Woolsey Brook at Pennington, N.J.	Lat 40°19'11", long 74°48'09", Mercer County, hydrologic unit 02040105, at bridge on Dublin Road, 0.5 mi upstream of confluence with unnamed trib and 0.8 mi southwest of Pennington.	.16	1985-87
01462744	Woolsey Brook trib at Pennington, N.J.	Lat 40°18'47", long 74°48'06", Mercer County, hydrologic unit 02040105, at bridge on Dublin Road, 0.3 mi north of Pennington Road (State Route 546) 0.45 mi upstream from Woolsey Brook and 1.2 mi south of Pennington.	.32	1985-87
01462745	Woolsey Brook trib 2 at mouth near Pennington, N.J.	Lat 40°18'55", long 74°48'49", Mercer County, hydrologic unit 02040105, at mouth, 200 ft upstream from bridge on Scotch Road over Woolsey Brook and 1.5 mi southwest of Pennington.	.46	1985-87
01462747	Woolsey Brook at Scotch Road near Pennington, N.J.	Lat 40°18'51", long 74°48'53", Mercer County, hydrologic unit 02040105, at bridge on Scotch Road, 0.5 mi north of State Route 546 at Harts Corner and 1.3 mi from mouth.	1.47	1985-87

Table 5.--Location, drainage area, and periods of record for streamflow-measurement sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Station name	Location	Drainage area (mi^2)	Streamflow-measurement period of record
01462750	Woolsey Brook at Bear Tavern, N.J.	Lat 40°18'27", long 74°49'36", Mercer County, hydrologic unit 02040105, at bridge on Pennington Road (State Route 546), downstream of unnamed pond, 0.5 mi upstream of mouth, 1.2 mi east of Bear Tavern Road (State Route 579) at Bear Tavern.	2.13	1985-87
01462755	Woolsey Brook trib 3 at Bear Tavern, N.J.	Lat 40°18'08", long 74°49'54", Mercer County, hydrologic unit 02040105, at bridge on Jacobs Creek Road, 250 ft upstream of mouth, 300 ft upstream of confluence of Jacobs Creek and Woolsey Brook, and 1.0 mi southeast of Bear Tavern.	.89	1985-87
01462756	Woolsey Brook at mouth at Bear Tavern, N.J.	Lat 40°18'07", long 74°49'58", Mercer County, hydrologic unit 02040105, 100 ft upstream of Jacobs Creek, 1,700 ft south of Pennington Road (State Route 546), 0.75 mi east of Bear Tavern Road (State Route 579).	3.54	1988
01462760	Jacobs Creek near Washington Crossing, N.J.	Lat 40°17'31", long 74°50'28", Mercer County, hydrologic unit 02040105, at bridge on Bear Tavern Road, 1.3 mi upstream from mouth and 1.4 mi southeast of Washington Crossing.	10.0	1957, 1971, 1985-87
01462765	Ewing Creek at Scotch Road near West Trenton, N.J.	Lat 40°17'13", long 74°48'45", Mercer County, hydrologic unit 02040105, at bridge on Scotch Road, 300 ft south of Interstate 95 exit, 3,800 ft downstream of small unnamed pond and 1.5 mi north of West Trenton.	1.24	1985-87
01462770	Ewing Creek at Nursery Road near West Trenton, N.J.	Lat 40°17'19", long 74°49'42", Mercer County, hydrologic unit 02040105, at bridge on Nursery Road, 0.6 mi from Bear Tavern Road (State Route 579), 0.8 mi upstream from mouth and 1.6 mi north of West Trenton.	2.29	1985-87
01462775	Ewing Creek at Jacobs Creek Road near West Trenton, N.J.	Lat 40°17'24", long 74°50'30", Mercer County, hydrologic unit 02040105, at bridge on Jacobs Creek Road, 200 ft north of southern intersection of Jacobs Creek Road and Bear Tavern Road, 300 ft upstream of mouth and 1.2 mi northeast of Somerset.	2.65	1985-87
01462800	Jacobs Creek at Somerset, N.J.	Lat 40°16'42", long 74°51'14", Mercer County, hydrologic unit 02040105, at bridge on State Route 29, 400 ft upstream from mouth, 0.3 mi north of Somerset and 1.4 mi south of Washington Crossing Road.	13.3	1958-62, 1964, 1985-87

Table 6.--Results of chemical analyses of surface-water samples from monitoring sites on Jacobs Creek, Stony Brook, and Beden Brook

[--, missing value; deg C, degrees Celsius; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; ft^3/S, cubic feet per second; ft, feet; mi^2, square miles; µg/L, micrograms per liter; mm of Hg, millimeters of mercury; NGVD, National Geodetic Vertical Datum; <, less than]

Station number	Date	Temperature water (deg C) (00010)	Barometric pressure (mm of Hg) (00025)	Streamflow, instantaneous (ft^3/s) (00061)	Gage height (ft above datum) (00065)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH (standard units) (00400)	pH lab (standard units) (00403)	Nitrogen, ammonia dissolved (mg/L as N) (00608)
01401000	04-02-87	9.5	760	75	2.47	169	12.5	7.60	8.10	0.040
	06-02-87	24.5	755	14	1.82	254	11.6	8.78	8.30	.020
	08-03-87	25.0	755	18	2.03	228	11.0	8.50	8.30	.020
	10-09-87	11.0	770	15	1.78	243	13.2	8.60	7.60	< .010
	12-02-87	7.0	760	70	2.48	184	12.1	7.68	8.10	.010
	02-05-88	.0	765	138	2.75	191	14.8	7.20	7.40	.100
	04-06-88	13.0	755	38	2.20	209	11.0	7.90	8.00	< .010
01401600	04-02-87	7.5	760	56	1.95	149	12.3	7.30	8.00	.040
	06-02-87	21.5	755	9.8	1.50	189	6.2	7.14	6.80	.280
	08-03-87	22.5	755	12	1.52	150	6.2	6.80	7.30	.180
	10-08-87	11.5	760	12	1.56	232	8.3	7.50	7.50	.030
	12-02-87	7.0	760	57	1.98	166	12.2	7.45	7.70	--
	02-04-88	2.5	755	362	3.46	177	12.5	7.20	7.40	.090
	04-05-88	13.5	760	35	1.78	179	11.6	8.10	8.10	.020
01462800	04-02-87	12.0	760	15	6.08	231	11.2	8.20	8.20	.020
	06-02-87	28.0	755	.97	7.20	271	8.3	8.30	8.50	.020
	08-04-87	23.5	760	2.0	7.28	292	8.0	7.80	8.20	< .010
	10-09-87	9.0	770	8.1	--	265	11.6	8.10	7.90	< .010
	12-03-87	3.5	760	19	6.75	229	13.6	7.30	8.00	< .010
	02-05-88	2.5	765	39	6.50	239	14.0	7.40	7.60	.020
	04-06-88	13.5	755	8.6	7.25	248	10.7	9.58	9.20	< .010

Station number	Date	Nitrogen, nitrite dissolved (mg/L as N) (00613)	Nitrogen, ammonia + organic dissolved (mg/L as N) (00623)	Nitrogen, NO2+NO3 dissolved (mg/L as N) (00631)	Phosphorus, dissolved (mg/L as P) (00666)	Phosphorus, ortho, dissolved (mg/L as P) (00671)	Carbon, organic dissolved (mg/L as C) (00681)	Carbon, organic suspended total (mg/L as C) (00689)	Cyanide dissolved (mg/L as Cn) (00723)	Calcium dissolved (mg/L as Ca) (00915)
01401000	04-02-87	0.010	0.50	0.690	0.040	<0.010	4.4	0.5	<0.01	12
	06-02-87	< .010	.90	< .100	.080	.050	4.3	.4	< .01	19
	08-03-87	< .010	.60	.310	.050	.040	3.0	< .1	< .01	17
	10-09-87	< .010	.30	.540	.100	.060	4.9	.1	< .01	18
	12-02-87	< .010	.20	.960	.070	.050	7.7	< .1	< .01	13
	02-05-88	< .010	.60	.940	.060	.040	4.7	.6	< .01	12
	04-06-88	.010	.40	.340	.040	.020	4.3	.3	< .01	15
01401600	04-02-87	.010	6.0	1.20	.050	.030	3.6	.3	< .01	11
	06-02-87	.090	1.2	1.30	.270	.190	6.3	.5	< .01	17
	08-03-87	.020	.70	1.20	.110	.080	9.0	< .1	< .01	9.2
	10-08-87	.020	.30	2.00	.230	.190	4.1	.1	< .01	18
	12-02-87	--	< .20	1.70	.070	--	4.7	< .1	< .01	13
	02-04-88	< .010	.40	1.40	.060	.030	3.6	.8	< .01	11
	04-05-88	.020	.30	.860	.060	.040	3.5	.5	< .01	13
01462800	04-02-87	< .010	.60	1.20	.030	.020	2.7	.2	< .01	15
	06-02-87	< .010	< .20	.230	.060	.040	2.7	.2	< .01	21
	08-04-87	< .010	.60	.460	.090	.020	4.8	< .1	< .01	20
	10-09-87	< .010	< .20	1.30	.040	.020	3.0	< .1	< .01	21
	12-03-87	< .010	< .20	1.80	.050	.030	3.5	< .1	< .01	17
	02-05-88	< .010	.20	1.90	.040	.030	2.3	.2	< .01	14
	04-06-88	< .010	.30	.600	.020	< .010	2.8	.2	< .01	17

Table 6.--Results of chemical analyses of surface-water samples from monitoring sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Date	Magnesium, dissolved (mg/L as Mg) (00925)	Sodium, dissolved (mg/L as Na) (00930)	Potassium, dissolved (mg/L as K) (00935)	Chloride, dissolved (mg/L as Cl) (00940)	Sulfate dissolved (mg/L as SO4) (00945)	Fluoride, dissolved (mg/L as F) (00950)	Silica, dissolved (mg/L as SiO2) (00955)	Arsenic dissolved (µg/L as As) (01000)	Beryllium, dissolved (µg/L as Be) (01010)
01401000	04-02-87	5.4	12	1.6	16	22	<0.10	11	<1	--
	06-02-87	8.4	18	2.7	27	27	.10	7.7	1	--
	08-03-87	7.1	16	2.8	21	23	.10	4.4	1	<0.5
	10-09-87	8.0	15	3.1	20	23	.20	5.4	1	< .5
	12-02-87	5.6	12	2.8	16	23	.20	12	1	--
	02-05-88	5.0	13	2.4	21	21	.20	11	<1	--
	04-06-88	6.5	13	1.7	18	28	.10	9.0	1	--
01401600	04-02-87	5.1	9.7	1.4	12	20	< .10	13	<1	--
	06-02-87	6.2	13	3.3	20	24	.10	4.8	2	--
	08-03-87	4.0	7.3	2.1	9.8	16	.10	5.3	1	< .5
	10-08-87	7.8	12	2.8	16	27	.10	9.9	1	< .5
	12-02-87	5.7	9.3	2.1	12	22	.20	14	<1	--
	02-04-88	4.7	12	2.0	19	19	.10	10	<1	--
	04-05-88	5.7	10	1.5	14	26	.10	13	1	--
01462800	04-02-87	7.1	16	1.6	27	23	< .10	11	<1	--
	06-02-87	8.9	18	2.4	41	27	.10	9.3	<1	< .5
	08-04-87	9.0	21	2.6	34	23	.20	4.1	<1	< .5
	10-09-87	9.4	16	2.3	26	26	.10	11	1	< .5
	12-03-87	7.9	13	2.1	20	24	.20	13	<1	--
	02-05-88	6.6	16	2.2	30	22	.10	12	1	--
	04-06-88	7.6	17	1.5	29	28	.10	8.5	<1	--

Station number	Date	Boron, dissolved (µg/L as B) (01020)	Cadmium dissolved (µg/L as Cd) (01025)	Chromium, dissolved (µg/L as Cr) (01030)	Copper, dissolved (µg/L as Cu) (01040)	Iron, dissolved (µg/L as Fe) (01046)	Lead, dissolved (µg/L as Pb) (01049)	Manganese, dissolved (µg/L as Mn) (01056)	Nickel, dissolved (µg/L as Ni) (01065)	Zinc, dissolved (µg/L as Zn) (01090)
01401000	04-02-87	30	<1	<10	3	80	<5	12	1	7
	06-02-87	40	<1	<10	3	71	<5	21	<1	<3
	08-03-87	50	<1	140	4	10	<5	7	2	8
	10-09-87	50	<1	10	3	48	<5	9	3	15
	12-02-87	40	<1	30	4	150	30	<10	1	<10
	02-05-88	20	<1	<1	5	120	5	20	<1	10
	04-06-88	30	<1	<1	3	97	<5	14	4	<3
01401600	04-02-87	30	<1	<10	3	110	<5	20	2	12
	06-02-87	60	<1	<10	8	50	<5	100	1	<10
	08-03-87	30	<1	130	4	22	<5	68	4	23
	10-08-87	40	<1	<10	4	47	<5	20	4	<3
	12-02-87	30	<1	290	4	94	<5	15	<1	11
	02-04-88	20	<1	<1	2	70	<5	20	<1	10
	04-05-88	30	<1	<1	3	97	<5	13	2	<3
01462800	04-02-87	30	<1	<10	2	14	<5	6	2	7
	06-02-87	40	<1	<10	3	7	<5	3	<1	<3
	08-04-87	50	<1	<10	2	17	<5	2	2	8
	10-09-87	50	<1	<10	1	23	<5	2	5	3
	12-03-87	30	<1	4	2	51	<5	5	2	10
	02-05-88	20	1	<1	2	40	<5	10	1	<10
	04-06-88	30	<1	<1	3	18	<5	2	2	<3

Table 6.--Results of chemical analyses of surface-water samples from monitoring sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Date	Aluminum, dissolved (µg/L as Al) (01106)	Selenium, dissolved (µg/L as Se) (01145)	Phenols total (µg/L) (32730)	Solids, residue at 180 deg C dissolved (mg/L) (70300)	Mercury dissolved (µg/L as Hg) (71890)	Altitude of land surface datum (ft above NGVD) (72000)	Drainage area (mi^2) (81024)	Specific conductance lab (µS/cm) (90095)	Alkalinity lab (mg/L as CaCO3) (90410)
01401000	04-02-87	80	<1	<1	105	<0.1	62.2	44.5	179	28
	06-02-87	20	<1	--	153	< .1	62.2	44.5	275	64
	08-03-87	20	<1	2	123	< .1	62.2	44.5	227	52
	10-09-87	20	<1	2	137	< .1	62.2	44.5	248	59
	12-02-87	170	<1	9	113	< .1	62.2	44.5	194	32
	02-05-88	160	1	<1	113	< .1	62.2	44.5	191	25
	04-06-88	20	--	5	127	< .1	62.2	44.5	209	40
01401600	04-02-87	110	<1	<1	88	< .1	38.1	27.6	161	25
	06-02-87	20	<1	8	123	< .1	38.1	27.6	221	41
	08-03-87	20	<1	4	70	.1	38.1	27.6	130	23
	10-08-87	20	<1	4	135	< .1	38.1	27.6	238	49
	12-02-87	60	<1	6	98	< .1	38.1	27.6	174	28
	02-04-88	70	<1	<1	109	< .1	38.1	27.6	173	20
	04-05-88	30	--	2	113	< .1	38.1	27.6	182	32
01462800	04-02-87	20	<1	<1	143	< .1	--	13.3	234	33
	06-02-87	10	<1	<1	166	< .1	--	13.3	296	58
	08-04-87	10	<1	1	164	< .1	--	13.3	293	58
	10-09-87	8	<1	2	145	< .1	--	13.3	274	53
	12-03-87	30	<1	3	126	< .1	--	13.3	228	37
	02-05-88	30	<1	<1	134	< .1	--	13.3	236	29
	04-06-88	10	--	3	142	< .1	--	13.3	248	40

Table 7.--Results of chemical analyses of low-flow water samples from sites on Jacobs Creek, Stony Brook, and Beden Brook

[deg C, degrees Celsius; mm of Hg, millimeters of mercury; ft^3/s, cubic feet per second; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; mi^2, square miles; *, replicate sample; <, less than; inst., instantaneous; --, missing value]

Station number	Date	Temperature water (deg C) (00010)	Barometric pressure (mm of Hg) (00025)	Discharge inst. (ft^3/s) (00061)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH (standard units) (00400)	pH lab (standard units) (00403)	Nitrogen, ammonia dissolved (mg/L as N) (00608)	Nitrogen, nitrite dissolved (mg/L as N) (00613)
01400840	04-14-88	8.0	750	0.27	247	13.7	8.20	7.60	0.030	<0.010
01400913	04-13-88	14.5	755	9.0	184	11.5	7.90	8.30	.030	< .010
01400930	04-13-88	9.5	755	.94	275	11.9	6.80	8.10	.030	.010
01400947	04-13-88	8.0	755	13	231	11.5	7.00	7.60	.010	.010
01400970	04-12-88	15.0	755	1.5	198	11.9	8.50	7.40	.040	< .010
01401000	04-12-88	11.5	755	25	226	11.7	7.90	7.70	.040	.020
01401515	04-15-88	12.0	755	1.3	149	11.1	7.90	8.20	.020	< .010
01401545	04-15-88	10.0	755	7.9	213	11.4	8.90	8.60	.030	.010
01401596	04-15-88	11.5	755	5.5	178	10.8	8.30	7.90	.420	.030
* 01401596	04-15-88	11.5	755	5.5	178	10.8	8.30	7.80	.420	.030
01462730	04-14-88	9.5	750	.84	182	12.2	7.90	7.80	.010	.010
01462756	04-14-88	14.5	750	1.2	238	12.6	8.40	8.10	.030	< .010
01462800	04-14-88	16.5	750	5.4	249	9.5	9.40	9.40	.030	< .010

Station number	Date	Nitrogen, ammonia + organic dissolved (mg/L as N) (00623)	Nitrogen, NO2+NO3 dissolved (mg/L as N) (00631)	Phosphorous dissolved (mg/L as P) (00666)	Phosphorous, ortho, dissolved (mg/L as P) (00671)	Carbon, organic dissolved (mg/L as C) (00681)	Carbon, organic suspended total (mg/L as C) (00689)	Cyanide dissolved (mg/L as Cn) (00723)	Calcium dissolved (mg/L as Ca) (00915)	Magnesium, dissolved (mg/L as Mg) (00925)
01400840	04-14-88	0.30	0.560	0.030	0.010	2.1	--	<0.01	23	8.0
01400913	04-13-88	.30	.400	.010	< .010	2.5	.4	< .01	14	6.1
01400930	04-13-88	< .20	1.00	.040	.020	2.5	.3	< .01	23	11
01400947	04-13-88	.20	.570	.070	.040	3.0	.3	< .01	16	7.5
01400970	04-12-88	.60	.150	.050	.010	5.0	1.1	< .01	14	6.2
01401000	04-12-88	.40	.400	.060	.030	3.3	.3	< .01	16	7.3
01401515	04-15-88	< .20	.180	.020	< .010	1.5	.2	< .01	11	5.0
01401545	04-15-88	.20	.750	.060	.040	2.4	.2	< .01	16	6.8
01401596	04-15-88	.80	.770	.240	.170	4.2	1.2	< .01	14	6.0
* 01401596	04-15-88	.90	.770	.230	.160	4.8	.8	< .01	15	6.0
01462730	04-14-88	.30	.630	.020	< .010	1.6	.2	< .01	15	6.1
01462756	04-14-88	.50	.130	.040	.020	4.5	.4	< .01	16	8.2
01462800	04-14-88	.20	.300	.030	.010	2.4	--	< .01	18	8.1

Station number	Date	Sodium, dissolved (mg/L as Na) (00930)	Potassium, dissolved (mg/L as K) (00935)	Chloride, dissolved (mg/L as Cl) (00940)	Sulfate dissolved (mg/L as SO4) (00945)	Fluoride, dissolved (mg/L as F) (00950)	Silica, dissolved (mg/L as SiO2) (00955)	Arsenic dissolved (µg/L as As) (01000)	Boron, dissolved (µg/L as B) (01020)	Cadmium dissolved (µg/L as Cd) (01025)
01400840	04-14-88	9.8	2.7	16	32	0.20	7.1	<1	30	<1
01400913	04-13-88	11	1.4	14	27	.10	12	<1	20	<1
01400930	04-13-88	14	1.1	19	36	.10	15	1	70	<1
01400947	04-13-88	14	1.7	19	28	.10	9.9	<1	30	<1
01400970	04-12-88	13	1.5	19	27	.10	7.1	<1	30	<1
01401000	04-12-88	14	1.8	20	30	.20	8.9	<1	30	<1
01401515	04-15-88	8.2	1.4	11	27	.10	13	<1	10	<1
01401545	04-15-88	12	1.5	18	28	.10	5.7	1	30	<1
01401596	04-15-88	13	1.7	16	28	.10	12	<1	30	<1
* 01401596	04-15-88	13	1.7	16	28	.10	12	<1	30	<1
01462730	04-14-88	9.5	1.0	14	28	.10	14	<1	30	<1
01462756	04-14-88	12	1.4	22	28	.10	7.7	<1	30	<1
01462800	04-14-88	15	1.5	30	29	.10	5.5	<1	30	<1

Table 7.--Results of chemical analyses of low-flow water samples from sites on Jacobs Creek, Stony Brook, and Beden Brook --Continued

Station number	Date	Chromium, dissolved (µg/L as Cr) (01030)	Copper, dissolved (µg/L as Cu) (01040)	Iron, dissolved (µg/L as Fe) (01046)	Lead, dissolved (µg/L as Pb) (01049)	Manganese, dissolved (µg/L as Mn) (01056)	Nickel, dissolved (µg/L as Ni) (01065)	Zinc, dissolved (µg/L as Zn) (01090)	Aluminum, dissolved (µg/L as Al) (01106)
01400840	04-14-88	<1	2	140	<5	42	1	<3	20
01400913	04-13-88	<1	3	62	<5	11	<1	<3	20
01400930	04-13-88	<1	4	7	<5	27	<1	<3	<10
01400947	04-13-88	<1	3	78	<5	29	<1	<3	<10
01400970	04-12-88	<1	4	6	<5	58	1	<3	10
01401000	04-12-88	<1	3	87	9	15	1	4	<10
01401515	04-15-88	<1	2	5	<5	1	1	<3	10
01401545	04-15-88	<1	5	88	<5	7	1	<3	20
01401596	04-15-88	<1	8	120	<5	11	<1	6	30
* 01401596	04-15-88	<1	5	140	<5	11	2	5	20
01462730	04-14-88	<1	4	20	<5	15	<1	<3	<10
01462756	04-14-88	<1	3	9	<5	24	1	<3	20
01462800	04-14-88	<1	2	25	<5	2	1	<3	20

Station number	Date	Selenium, dissolved (µg/L as Se) (01145)	Phenols, total (µg/L) (32730)	Solids, residue at 180 deg C dissolved (mg/L) (70300)	Mercury dissolved (µg/L as Hg) (71890)	Altitude of land surface datum (ft above NGVD) (72000)	Drainage area (mi^2) (81024)	Specific conductance, lab (µS/cm) (90095)	Alkalinity, lab (mg/L as $CaCO_3$) (90410)
01400840	04-14-88	<1	1	145	< .1	--	2.21	246	59
01400913	04-13-88	<1	2	110	< .1	--	18.9	186	36
01400930	04-13-88	<1	1	163	< .1	162	1.99	284	67
01400947	04-13-88	<1	2	130	< .1	139	26.7	216	45
01400970	04-12-88	<1	1	114	< .1	126	3.83	202	36
01401000	04-12-88	<1	2	129	< .1	62.2	44.5	226	45
01401515	04-15-88	<1	<1	93	< .1	--	--	152	27
01401545	04-15-88	<1	2	116	< .1	--	16.0	211	41
01401596	04-15-88	<1	2	121	< .1	--	9.49	207	40
* 01401596	04-15-88	<1	1	122	< .1	--	9.49	207	40
01462730	04-14-88	<1	2	114	< .1	--	1.84	185	35
01462756	04-14-88	<1	1	122	< .1	--	3.54	225	41
01462800	04-14-88	<1	1	136	< .1	--	13.3	256	42

Table 8.--Percentages and concentrations of trace elements on bottom sediments less than 63 microns in diameter at sites on Jacobs Creek, Stony Brook, and Beden Brook

[%, percent; PPM, parts per million; S, induction coupled plasma atomic emission spectroscopy; AA, atomic absorbtion hydride generation analysis type; CVAA, cold vapor atomic absorption analysis type; N, not detected at 0.1 of PPM detection limit; NA, not available; <, less than; all samples collected by U.S. Geological Survey personnel and analyzed at U.S. Geological Survey Geologic Division laboratory in Lakewood, Colorado]

Trace element	Unit	Type of analysis	Site					
			01401535	014016000	01462730	01462760	01400947	01400985
Calcium	%	S	0.41	0.33	0.55	0.32	0.38	0.30
Aluminum	%	S	8.7	9.6	8.0	7.7	8.8	9.8
Iron	%	S	5.4	6.1	6.9	4.4	6.6	7.6
Potassium	%	S	2.8	3.2	2.4	2.3	2.9	3.4
Magnesium	%	S	1.5	1.5	1.1	.97	1.4	1.7
Sodium	%	S	1.7	1.6	1.9	1.5	2.1	2.3
Phosphorus	%	S	.10	.09	.11	.09	.14	.12
Titanium	%	S	.44	.47	.62	.46	.45	.48
Manganese	PPM	S	1,700	1,400	2,200	760	2,100	1,900
Silver	PPM	S	<2	<2	<2	<2	<2	<2
Arsenic	PPM	S	10	<10	10	<10	10	10
Gold	PPM	S	<8	<8	<8	<8	<8	<8
Boron	PPM	S	NA	NA	NA	NA	NA	NA
Barium	PPM	S	540	500	500	450	510	650
Beryllium	PPM	S	3	3	3	3	3	4
Bismuth	PPM	S	<10	<10	<10	<10	<10	<10
Cadmium	PPM	S	<2	<2	<2	<2	<2	<2
Cerium	PPM	S	97	90	100	90	100	90
Cobalt	PPM	S	25	26	33	16	34	37
Chromium	PPM	S	100	120	87	83	110	120
Copper	PPM	S	40	34	67	34	32	35
Europium	PPM	S	<2	<2	2	<2	<2	<2
Gallium	PPM	S	23	24	21	18	23	27
Germanium	PPM	S	NA	NA	NA	NA	NA	NA
Holmium	PPM	S	<4	<4	<4	<4	<4	<4
Lanthanum	PPM	S	45	41	50	43	49	44
Lithium	PPM	S	81	95	53	65	81	100
Molybdenum	PPM	S	<2	<2	<2	<2	<2	<2
Niobium	PPM	S	13	14	10	11	14	16
Neodymium	PPM	S	42	41	48	41	45	37
Nickel	PPM	S	43	51	36	34	44	57
Lead	PPM	S	59	64	39	44	49	62
Scandium	PPM	S	15	16	17	13	16	17
Tin	PPM	S	<10	<10	<10	<10	<10	<10
Strontium	PPM	S	120	82	93	73	80	91
Tantalum	PPM	S	<40	<40	<40	<40	<40	<40
Thorium	PPM	S	15	16	17	15	17	16
Uranium	PPM	S	<100	<100	<100	<100	<100	<100
Vanadium	PPM	S	130	140	160	110	140	150
Tungston	PPM	S	NA	NA	NA	NA	NA	NA
Yttrium	PPM	S	22	22	30	22	25	22
Ytterbium	PPM	S	3	3	4	3	3	3
Zinc	PPM	S	170	180	150	120	170	230
Zirconium	PPM	S	NA	NA	NA	NA	NA	NA
Arsenic	PPM	AA	11	11	10	13	2.3	N
Mercury	PPM	CVAA	.4	.14	.12	.16	.12	.08
Selenium	PPM	AA	.7	.7	.5	.8	NA	.6

Table 8.--Percentages and concentrations of trace elements on bottom sediments less than 63 microns in diameter at sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Trace element	Unit	Type of analysis	Site 01400840	01401000	01400913	01401515	01401521
Calcium	%	S	.58	.41	.39	.31	.39
Aluminum	%	S	8.4	9.4	8.4	9.3	8.1
Iron	%	S	6.8	7.2	5.7	7.4	5.1
Potassium	%	S	2.5	3.0	2.8	3.3	2.5
Magnesium	%	S	1.5	1.4	1.3	1.3	1.3
Sodium	%	S	2.2	2.3	1.9	2.5	1.7
Phosphorus	%	S	.13	.12	.09	.44	.12
Titanium	%	S	.52	.44	.47	.48	.44
Manganese	PPM	S	1,600	2,200	1,000	2,300	1,700
Silver	PPM	S	<2	<2	<2	<2	<2
Arsenic	PPM	S	10	10	<10	20	<10
Gold	PPM	S	<8	<8	<8	<8	<8
Boron	PPM	S	NA	NA	NA	NA	NA
Barium	PPM	S	510	610	500	670	520
Beryllium	PPM	S	3	4	3	4	3
Bismuth	PPM	S	<10	<10	<10	<10	<10
Cadmium	PPM	S	<2	<2	<2	<2	<2
Cerium	PPM	S	94	97	94	100	100
Cobalt	PPM	S	35	38	27	41	24
Chromium	PPM	S	110	120	100	120	89
Copper	PPM	S	44	42	37	50	51
Europium	PPM	S	<2	<2	<2	<2	<2
Gallium	PPM	S	22	25	20	25	20
Germanium	PPM	S	NA	NA	NA	NA	NA
Holmium	PPM	S	<4	<4	<4	<4	<4
Lanthanum	PPM	S	44	46	45	45	49
Lithium	PPM	S	71	83	68	81	69
Molybdenum	PPM	S	<2	<2	<2	<2	<2
Niobium	PPM	S	14	15	13	16	11
Neodymium	PPM	S	40	42	41	41	45
Nickel	PPM	S	43	53	40	50	38
Lead	PPM	S	48	150	45	60	63
Scandium	PPM	S	15	16	15	16	13
Tin	PPM	S	<10	<10	<10	<10	<10
Strontium	PPM	S	130	85	87	78	100
Tantalum	PPM	S	<40	<40	<40	<40	<40
Thorium	PPM	S	16	17	15	17	17
Uranium	PPM	S	<100	<100	<100	<100	<100
Vanadium	PPM	S	160	150	140	160	120
Tungston	PPM	S	NA	NA	NA	NA	NA
Yttrium	PPM	S	23	24	23	23	22
Ytterbium	PPM	S	3	3	3	3	3
Zinc	PPM	S	180	230	160	210	170
Zirconium	PPM	S	NA	NA	NA	NA	NA
Arsenic	PPM	AA	N	N	N	N	N
Mercury	PPM	CVAA	.12	.16	.12	.10	.20
Selenium	PPM	AA	.6	.6	.6	.6	.6

Table 10.--Concentrations of organic compounds on unsorted bottom sediments at sites on Jacobs Creek, Stony Brook, and Beden Brook

[tot in bot mat, total in bottom material; g/kg, grams per kilogram; µg/kg, micrograms per kilogram; mi^2, square miles; <, less than; all samples collected by U.S. Geological Survey personnel and analyzed at U.S. Geological Survey National Water-Quality Laborabory in Arvada, Colorado; number in parenthesis is lab parameter code]

Station number	Station name	Date	Time	Carbon, inorganic, tot in bot mat (g/kg as C) (00686)
01400840	Stony Brook at Linvale, N.J.	09-14-87	0900	0.2
01400913	Stony Brook at Titus Mill Road near Glenmoore, N.J.	10-30-87	1100	.1
01400947	Stony Brook at Pennington, N.J.	11-03-87	0900	.1
01400985	Stony Brook at Province Line Road near Princeton, N.J.	11-05-87	1000	.1
01401000	Stony Brook at Princeton, N.J.	11-03-87	1000	.1
01401515	Beden Brook tributary at First Bridge upstream of Railroad Bridge at Hopewell, N.J.	10-30-87	1000	.1
01401521	Beden Brook downstream of sewage-treatment plant at Stoutsburg, N.J.	10-29-87	1100	.1
01401535	Beden Brook near Blawenburg, N.J.	09-17-87	1000	.2
01401600	Beden Brook near Rocky Hill, N.J.	09-15-87	0930	.3
01462730	Jacobs Creek at Woosamonsa Road near Harbourton, N.J.	09-10-87	0930	.2
01462760	Jacobs Creek near Washington Crossing, N.J.	11-06-87	1215	.2

Table 10.--Concentrations of organic compounds on unsorted bottom sediments at sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Date	Carbon, inorganic + organic tot. in bot mat (g/kg as C) (00693)	Ace-naphth-ylene tot in bot mat (μg/kg) (34203)	Ace-naphth-ene tot in bot mat (μg/kg) (34208)	Anthra-cene tot in bot mat (μg/kg) (34223)	Benzo B Fluor-an-thene tot in bot mat (μg/kg) (34233)	Benzo K Fluor-an-thene tot in bot mat (μg/kg) (34245)	Benzo-A-Pyrene tot in bot mat (μg/kg) (34250)	Bis (2-Chloro-ethyl) ether tot in bot mat (μg/kg) (34276)	Bis (2-Chloro-ethoxy) methane tot in bot mat (μg/kg) (34281)	Bis (2-Chloro-iso-propyl) ether tot in bot mat (μg/kg) (34286)
01400840	09-14-87	9.7	<200	<200	<200	<400	<400	<400	<200	<200	<200
01400913	10-30-87	2.8	<200	<200	<200	<400	<400	<400	<200	<200	<200
01400947	11-03-87	3.1	<200	<200	210	<400	<400	<400	<200	<200	<200
01400985	11-05-87	3.0	<200	<200	<200	<400	<400	<400	<200	<200	<200
01401000	11-03-87	4.7	<200	<200	<200	<400	<400	<400	<200	<200	<200
01401515	10-30-87	3.7	<200	<200	<200	<400	<400	<400	<200	<200	<200
01401521	10-29-87	5.9	<200	<200	<200	<400	<400	<400	<200	<200	<200
01401535	09-17-87	11	<200	<200	<200	<400	<400	<400	<200	<200	<200
01401600	09-15-87	5.7	<200	<200	<200	<400	<400	<400	<200	<200	<200
01462730	09-10-87	6.4	<200	<200	<200	<400	<400	<400	<200	<200	<200
01462760	11-06-87	2.6	<200	<200	<200	<400	<400	<400	<200	<200	<200

Table 10.--Concentrations of organic compounds on unsorted bottom sediments at sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Date	N-butyl benzyl phthalate tot in bot mat (μg/kg) (34295)	Chrysene tot in bot mat (μg/kg) (34323)	Diethyl phthalate tot in bot mat (μg/kg) (34339)	Dimethyl phthalate tot in bot mat (μg/kg) (34344)	Fluoranthene tot in bot mat (μg/kg) (34379)	Fluorene tot in bot mat (μg/L) (34384)	Hexachlorocyclopentadiene tot in bot mat (μg/kg) (34389)	Hexachloroethane tot in bot mat (μg/kg) (34399)	Indeno (1,2,3-CD) pyrene tot in bot mat (μg/kg) (34406)
01400840	09-14-87	<200	<400	<200	<200	<200	<200	<200	<200	<400
01400913	10-30-87	<200	<400	<200	<200	<200	<200	<200	<200	<400
01400947	11-03-87	<200	<400	<200	<200	<200	<200	<200	<200	<400
01400985	11-05-87	<200	<400	<200	<200	<200	<200	<200	<200	<400
01401000	11-03-87	<200	<400	<200	<200	400	<200	<200	<200	<400
01401515	10-30-87	<200	<400	<200	<200	<200	<200	<200	<200	<400
01401521	10-29-87	<200	<400	<200	<200	<200	<200	<200	<200	<400
01401535	09-17-87	<200	<400	<200	<200	<200	<200	<200	<200	<400
01401600	09-15-87	<200	<400	<200	<200	<200	<200	<200	<200	<400
01462730	09-10-87	<200	<400	<200	<200	<200	<200	<200	<200	<400
01462760	11-06-87	<200	<400	<200	<200	850	<200	<200	<200	<400

Table 10.--Concentrations of organic compounds on unsorted bottom sediments at sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Date	Iso-phorone tot in bot mat (µg/kg) (34411)	N-nitro-sodi-N-propyl-amine tot in bot mat (µg/kg) (34431)	N-nitro-sodi-pheny-lamine tot in bot mat (µg/kg) (34436)	N-nitro-sodi-methy-lamine tot in bot mat (µg/kg) (34441)	Naphth-alene tot in bot mat (µg/kg) (34445)	Nitro-benzene tot in bot mat (µg/kg) (34450)	Para-chloro-meta cresol tot in bot mat (µg/kg) (34455)	Phenan-threne tot in bot mat (µg/kg) (34464)	Pyrene tot in bot mat (µg/kg) (34472)
01400840	09-14-87	<200	<200	<200	<200	<200	<200	<600	<200	<200
01400913	10-30-87	<200	<200	<200	<200	<200	<200	<600	<200	<200
01400947	11-03-87	<200	<200	<200	<200	490	<200	<600	<200	<200
01400985	11-05-87	<200	<200	<200	<200	<200	<200	<600	<200	<200
01401000	11-03-87	<200	<200	<200	<200	<200	<200	<600	250	320
01401515	10-30-87	<200	<200	<200	<200	<200	<200	<600	<200	<200
01401521	10-29-87	<200	<200	<200	<200	<200	<200	<600	<200	<200
01401535	09-17-87	<200	<200	<200	<200	<200	<200	<600	<200	<200
01401600	09-15-87	<200	<200	<200	<200	<200	<200	<600	<200	<200
01462730	09-10-87	<200	<200	<200	<200	<200	<200	<600	<200	<200
01462760	11-06-87	<200	<200	<200	<200	<200	<200	<600	360	640

Table 10.--Concentrations of organic compounds on unsorted bottom sediments at sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Date	Benzoghi perylene1,12-benzoperylene tot in bot mat (µg/kg) (34524)	Benzo A anthracene1,2-benzanthracene tot in bot mat (µg/kg) (34529)	1,2-Di-chloro-benzene tot in bot mat (µg/kg) (34539)	1,2,4-Tri-chloro-benzene tot in bot mat (µg/kg) (34554)	1,2,5,6-Dibenz-anthra-cene tot in bot mat (µg/kg) (34559)	1,3-Di-chloro-benzene tot in bot mat (µg/kg) (34569)	1,4-Di-chloro-benzene tot in bot mat (µg/kg) (34574)	2-Chloro-naph-thalene tot in bot mat (µg/kg) (34584)	2-Chloro-phenol tot in bot mat (µg/kg) (34589)
01400840	09-14-87	<400	<400	<200	<200	<400	<200	<200	<200	<200
01400913	10-30-87	<400	<400	<200	<200	<400	<200	<200	<200	<200
01400947	11-03-87	<400	<400	<200	<200	<400	<200	<200	<200	<200
01400985	11-05-87	<400	<400	<200	<200	<400	<200	<200	<200	<200
01401000	11-03-87	<400	<400	<200	<200	<400	<200	<200	<200	<200
01401515	10-30-87	<400	<400	<200	<200	<400	<200	<200	<200	<200
01401521	10-29-87	<400	<400	<200	<200	<400	<200	<200	<200	<200
01401535	09-17-87	<400	<400	<200	<200	<400	<200	<200	<200	<200
01401600	09-15-87	<400	<400	<200	<200	<400	<200	<200	<200	<200
01462730	09-10-87	<400	<400	<200	<200	<400	<200	<200	<200	<200
01462760	11-06-87	<400	<400	<200	<200	<400	<200	<200	<200	<200

Table 10.--Concentrations of organic compounds on unsorted bottom sediments at sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Date	2-Nitrophenol tot in bot mat (µg/kg) (34594)	Di-N-octyl phthalate tot in bot mat (µg/kg) (34599)	2,4-Dichlorophenol tot in bot mat (µg/kg) (34604)	2,4-DP, in tot in bot mat (µg/kg) (34609)	2,4-Dinitrotoluene tot in bot mat (µg/kg) (34614)	2,4-Dinitrophenol tot in bot mat (µg/kg) (34619)	2,4,6-Trichlorophenol tot in bot mat (µg/kg) (34624)	2,6-Dinitrotoluene tot in bot mat (µg/kg) (34629)	4-Bromophenyl phenyl ether tot in bot mat (µg/kg) (34639)
01400840	09-14-87	<200	<400	<200	<200	<200	<600	<600	<200	<200
01400913	10-30-87	<200	<400	<200	<200	<200	<600	<600	<200	<200
01400947	11-03-87	<200	<400	<200	<200	<200	<600	<600	<200	<200
01400985	11-05-87	<200	<400	<200	<200	<200	<600	<600	<200	<200
01401000	11-03-87	<200	<400	<200	<200	<200	<600	<600	<200	<200
01401515	10-30-87	<200	<400	<200	<200	<200	<600	<600	<200	<200
01401521	10-29-87	<200	<400	<200	<200	<200	<600	<600	<200	<200
01401535	09-17-87	<200	<400	<200	<200	<200	<600	<600	<200	<200
01401600	09-15-87	<200	<400	<200	<200	<200	<600	<600	<200	<200
01462730	09-10-87	<200	<400	<200	<200	<200	<600	<600	<200	<200
01462760	11-06-87	<200	<400	<200	<200	<200	<600	<600	<200	<200

Table 10.--Concentrations of organic compounds on unsorted bottom sediments at sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Date	Chloro-phenyl phenyl ether total (µg/L) (34641)	4-Nitro-phenol tot in bot mat (µg/kg) (34649)	4,6-Dinitro-ortho-cresol tot in bot mat (µg/kg) (34660)	Phenol (C6H-5OH) tot in bot mat (µg/kg) (34695)	Penta-chloro-phenol tot in bot mat (µg/kg) (39061)	Bis(2-ethyl hexyl) phthal-ate tot in bot mat (µg/kg((39102)	Di-N-butyl phthal-ate tot in bot mat (µg/kg) (39112)	PCN, tot in bot mat (µg/kg) (39251)	Aldrin, tot in bot mat (µg/kg) (39333)
01400840	09-14-87	<200	<600	<600	<200	<600	<200	<200	<1.0	<0.1
01400913	10-30-87	<200	<600	<600	<200	<600	<200	<200	<1.0	< .1
01400947	11-03-87	<200	<600	<600	<200	<600	<200	<200	<1.0	< .1
01400985	11-05-87	<200	<600	<600	<200	<600	<200	<200	<1.0	< .1
01401000	11-03-87	<200	<600	<600	<200	<600	<200	<200	<1.0	< .1
01401515	10-30-87	<200	<600	<600	<200	<600	<200	<200	<1.0	< .1
01401521	10-29-87	<200	<600	<600	<200	<600	<200	<200	<1.0	< .1
01401535	09-17-87	<200	<600	<600	<200	<600	<200	<200	<1.0	< .1
01401600	09-15-87	<200	<600	<600	<200	<600	<200	<200	<1.0	<5.9
01462730	09-10-87	<200	<600	<600	<200	<600	<200	<200	<1.0	< .1
01462760	11-06-87	<200	<600	<600	<200	<600	<200	<200	<1.0	< .1

Table 10.--Concentrations of organic compounds on unsorted bottom sediments at sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Date	Lindane, tot in bot mat (µg/kg) (39343)	Chlordane, tot in bot mat (µg/kg) (39351)	DDD, tot in bot mat (µg/kg) (39363)	DDE, tot in bot mat (µg/kg) (39368)	DDT, tot in bot mat (µg/kg) (39373)	Dieldrin, tot in bot mat (µg/kg) (39383)	Endosulfan, tot in bot mat (µg/kg) (39389)	Endrin, tot in bot mat (µg/kg) (39393)	Ethion, tot in bot mat (µg/kg) (39399)
01400840	09-14-87	<0.1	<1.0	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
01400913	10-30-87	< .1	1.0	.1	.1	< .1	< .1	< .1	< .1	< .1
01400947	11-03-87	< .1	1.0	.2	.3	.8	.3	< .1	< .1	< .1
01400985	11-05-87	< .1	1.0	.3	.5	1.3	.3	< .1	< .1	< .1
01401000	11-03-87	< .1	12	2.7	<5.5	<24	.6	< .1	< .1	< .1
01401515	10-30-87	< .1	<1.0	< .1	.1	< .1	< .1	< .1	< .1	< .1
01401521	10-29-87	< .1	1.0	.2	.3	<1.0	.2	< .1	< .1	< .1
01401535	09-17-87	< .1	<1.0	< .1	.2	< .1	< .1	< .1	< .1	< .1
01401600	09-15-87	< .1	<3.0	.1	<7.9	< .1	.2	< .1	< .1	< .1
01462730	09-10-87	< .1	<1.0	< .1	< .1	< .1	< .1	< .1	< .1	< .1
01462760	11-06-87	< .1	2.0	.4	.5	4.7	.2	< .1	< .1	< .1

Table 10.--Concentrations of organic compounds on unsorted bottom sediments at sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Date	Toxaphene, tot in bot mat (µg/kg) (39403)	Heptachlor, tot in bot mat (µg/kg) (39413)	Heptachlor epoxide, tot in bot mat (µg/kg) (39423)	Methoxychlor, tot in bot mat (µg/kg) (39481)	PCB, tot in bot mat (µg/kg) (39519)	Malathion, tot in bot mat (µg/kg) (39531)	Parathion, tot in bot mat (µg/kg) (39541)	Diazinon, tot in bot mat (µg/kg) (39571)	Methyl parathion, tot in bot mat (µg/kg) (39601)
01400840	09-14-87	<10	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1
01400913	10-30-87	<10	< .1	< .1	< .1	<1	< .1	< .1	< .1	< .1
01400947	11-03-87	<10	< .1	< .1	<10	3	< .1	< .1	< .1	< .1
01400985	11-05-87	<10	< .1	< .1	< .1	3	< .1	< .1	< .1	< .1
01401000	11-03-87	<10	.4	.8	< .1	50	< .1	< .1	.2	< .1
01401515	10-30-87	<10	< .1	< .1	< .1	<1	< .1	< .1	< .1	< .1
01401521	10-29-87	<10	< .1	< .1	<9.0	<1	< .1	< .1	< .1	< .1
01401535	09-17-87	<10	< .1	< .1	< .1	2	< .1	< .1	< .1	< .1
01401600	09-15-87	<10	< .1	< .1	< .1	120	< .1	< .1	< .1	< .1
01462730	09-10-87	<10	< .1	< .1	< .1	<1	< .1	< .1	< .1	< .1
01462760	11-06-87	<10	< .1	< .1	<11	<1	< .1	< .1	< .1	< .1

Table 10.--Concentrations of organic compounds on unsorted bottom sediments at sites on Jacobs Creek, Stony Brook, and Beden Brook--Continued

Station number	Date	Hexa-chloro-benzene tot in bot mat (µg/kg) (39701)	Hexa-chloro-but-adiene tot in bot mat (µg/kg) (39705)	Mirax, tot in bot mat (µg/kg) (39758)	Tri-thion, tot in bot mat (µg/kg) (39787)	Methyl tri-thion, tot in bot mat (µg/kg) (39791)	Altitude of land surface datum (ft above NGVD) (72000)	Drain-age area (mi^2) (81024)	Per-thane tot in bot mat (µg/kg) (81886)
01400840	09-14-87	<200	<200	<0.1	<0.1	<0.1	--	2.21	<1.00
01400913	10-30-87	<200	<200	<.1	<.1	<.1	--	18.9	<1.00
01400947	11-03-87	<200	<200	<.1	<.1	<.1	139	26.7	<1.00
01400985	11-05-87	<200	<200	<.1	<.1	<.1	--	36.2	<1.00
01401000	11-03-87	<200	<200	<.1	<.1	<.1	62.2	44.5	<1.00
01401515	10-30-87	<200	<200	<.1	<.1	<.1	--	--	<1.00
01401521	10-29-87	<200	<200	<.1	<.1	<.1	--	6.73	<1.00
01401535	09-17-87	<200	<200	<.1	<.1	<.1	--	15.3	<1.00
01401600	09-15-87	<200	<200	<.1	<.1	<.1	38.1	27.6	<200.0
01462730	09-10-87	<200	<200	<.1	<.1	<.1	--	1.84	<1.00
01462760	11-06-87	<200	<200	<.1	<.1	<.1	--	10.0	<1.00

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987

[Taxa, number of different taxonomic units or categories of organisms (such as species, genus, family); MI/SF, mean number of individuals per square foot; <, less than]

JACOBS CREEK SITE 01462800	Spring	Summer	Fall
Taxa	39	48	41
MI/SF	67.3	229	190.7
Species diversity index	3.85	3.74	3.53
Equitability index	.54	.40	.40
Dominant species (percent abundance)	Orthocladius thienemani (38) Simulium vittatum (9) Nais communis (6)	Micropsectra sp.7 (28) Cricotopus bicinctus (19) Cricotopus slossonae (9)	Orthocladius dorenus (30) Orthocladius rivulorum (20)
Group (percent abundance)			
Worms	16	<1	<1
Crustaceans	1	<1	6
Mayflies	5	4	5
Caddisflies	4	4	4
Physa snails	0	<1	<1
Ecological niche (percent abundance)			
Predator	7	3	11
Scavenger	2	1	8
Filter feeder	17	51	4
Detritivore	23	4	5
Herbivore	48	32	68
Omnivore	<1	2	0
Periphyton feeder	1	6	3
Pollutional classification (percent abundance)			
Tolerant	2	1	2
Facultative	42	81	73
Intolerant	55	18	24

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987--Continued

	JACOBS CREEK SITE 01462760		
	Spring	Summer	Fall
Taxa	74	50	53
MI/SF	419.3	197.3	235.6
Species diversity index	4.36	3.67	3.80
Equitability index	.41	.37	.39
Dominant species (percent abundance)	Orthocladius thienemani (25) Calopsectra sp.4 (13) Nais communis (7) Nais pseudobtusa (5)	Cheumatopsyche sp. (37) Neocloeon sp. (10) Psephenus herricki (9)	Cheumatopsyche sp. (37) Stenonema Orthocladius dorenus (7)
Group (percent abundance)			
Worms	24	<1	<1
Crustaceans	1	<1	3
Mayflies	9	18	22
Caddisflies	2	54	49
Physa snails	0	0	0
Ecological niche (percent abundance)			
Predator	6	5	6
Scavenger	<1	5	5
Filter feeder	18	60	49
Detritivore	31	13	10
Herbivore	40	5	12
Omnivore	1	<1	11
Periphyton feeder	3	11	6
Pollutional classification (percent abundance)			
Tolerant	4	1	3
Facultative	44	73	78
Intolerant	52	26	19

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987--Continued

JACOBS CREEK SITE 01462739

	Spring	Summer	Fall
Taxa	46	85	64
MI/SF	102	1,154.67	1,104
Species diversity index	3.80	3.85	3.25
Equitability index	.45	.25	.21
Dominant species (percent abundance)	Orthocladius thienemani (41) Paraleptophbia sp. (7) Ephemerella dorothea (7)	Cheumatopsyche sp. (26) Rheotanytarsus exigua (22) Hydropsyche betteni (10)	Cheumatopsyche sp. (34) Hydropsyche betteni (20)
Group (percent abundance)			
Worms	9	1	1
Crustaceans	0	<1	<1
Mayflies	18	11	4
Caddisflies	2	39	58
Physa snails	<1	0	0
Ecological niche (percent abundance)			
Predator	4	4	4
Scavenger	<1	3	7
Filter feeder	5	67	58
Detritivore	22	10	2
Herbivore	64	11	25
Omnivore	3	1	1
Periphyton feeder	2	4	3
Pollutional classification (percent abundance)			
Tolerant	5	2	7
Facultative	21	88	81
Intolerant	73	9	11

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987--Continued

JACOBS CREEK SITE 01462733

	Spring	Summer	Fall
Taxa	62	101	67
MI/SF	365.3	2,055.3	806.3
Species diversity index	3.71	4.01	3.59
Equitability index	.31	.23	.26
Dominant species (percent abundance)	Ephemerella dorothea (38) Amphinemura delosa (10) Orthocladius thienemanni (9)	Cheumatopsyche sp. (17) Rheotanytarsus exigua (17) Cricotopus bicinctus (17)	Hydropsyche betteni (33) Cheumatopsyche sp. (20)
Group (percent abundance)			
lorms	1	1	1
Crustaceans	0	<1	<1
Mayflies	51	11	7
Caddisflies	1	33	65
Physa snails	<1	0	<1
Ecological niche (percent abundance)			
Predator	5	3	4
Scavenger	<1	2	4
Filter feeder	2	51	63
Detritivore	48	12	10
Herbivore	39	21	10
Omnivore	1	5	1
Periphyton feeder	3	6	7
Pollutional classification (percent abundance)			
Tolerant	<1	3	4
Facultative	20	77	73
Intolerant	1	3	4

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987--Continued

JACOBS CREEK SITE 01462730	Spring	Summer	Fall
Taxa	60	52	73
MI/SF	266.7	132.3	505.3
Species diversity index	4.6	4.27	4.26
Equitability index	.60	.55	.40
Dominant species (percent abundance)	Ephemerella dorothea (23) Amphinemura delosa (11) Paraleptophlebia sp. (11) Psephenus herricki (6)	Psephenus herricki (17) Rheotanytarsus exigua (15) Cheumatopsyche sp. (15) Chimarra aterrima (5)	Cheumatopsyche sp. (30) Hydrospyche betteni (13) Chimarra aterrima (9)
Group (percent abundance)			
Worms	1	3	4
Crustaceans	<1	<1	0
Mayflies	41	8	13
Caddisflies	2	33	61
Physa snails	0	0	0
Ecological niche (percent abundance)			
Predator	3	10	6
Scavenger	1	1	1
Filter feeder	1	46	60
Detritivore	39	6	12
Herbivore	47	14	10
Omnivore	<1	1	3
Periphyton feeder	8	21	6
Pollutional classification (percent abundance)			
Tolerant	<1	8	4
Facultative	24	48	58
Intolerant	75	43	37

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987--Continued

STONY BROOK SITE 01401000

	Spring	Summer	Fall
Taxa	64	39	42
MI/SF	171.7	154.3	79.3
Species diversity index	4.85	3.51	4.39
Equitability index	.67	.42	.74
Dominant species (percent abundance)	Plumatella repens (12) Simulium vittatum (11) Stenelmis markeli (8) Ephemerella invaria (6) Cricotopus bicinctus (6) Cricotopus exilis (5) Orthocladius thienemanni (5)	Stenelmis markeli (38) Dugesia tigrina (11) Prostoma rubrum (9)	Stenelmis markeli (21) Cricotopus sp. 1 (8) Orthocladius dorenus (8) Lumbriculus variegatus (7) Dugesia tigrina (6)
Group (percent abundance)			
Worms	10	0	9
Crustaceans	10	0	0
Mayflies	15	4	1
Caddisflies	2	5	4
Physa snails	0	0	2
Ecological niche (percent abundance)			
Predator	4	19	7
Scavenger	1	13	15
Filter feeder	26	6	10
Detritivore	26	3	11
Herbivore	32	47	48
Omnivore	3	1	<1
Periphyton feeder	8	12	8
Pollutional classification (percent abundance)			
Tolerant	16	12	15
Facultative	53	29	50
Intolerant	1	59	34

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987--Continued

STONY BROOK SITE 01400985

	Spring	Summer	Fall
Taxa	93	68	86
MI/SF	771.3	617	1,311.3
Species diversity index	4.20	4.50	3.97
Equitability index	.29	.49	.27
Dominant species (percent abundance)	Fredericella sultana (32) Simulium vittatum (14) Caenis sp. (6)	Rheotanytarsus exigua (15) Cheumatopsyche sp. (15) Agraylea sp. (9) Stenelmis markeli (7) Neocloeon (4)	Cheumatopsyche sp. (29) Stenonema smithae (16) Symphitopsyche bifida (10)
Group (percent abundance)			
Worms	9	<1	<1
Crustaceans	1	1	1
Mayflies	11	6	18
Caddisflies	2	39	49
Physa snails	<1	0	<1
Ecological niche (percent abundance)			
Predator	4	7	7
Scavenger	1	3	3
Filter feeder	58	54	55
Detritivore	20	7	18
Herbivore	13	8	9
Omnivore	1	1	2
Periphyton feeder	3	20	6
Pollutional classification (percent abundance)			
Tolerant	2	4	3
Facultative	50	59	72
Intolerant	47	37	25

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987--Continued

	STONY BROOK SITE 01400947		
	Spring	Summer	Fall
Taxa	95	66	83
MI/SF	2,244.7	1,007.7	688.7
Species diversity index	3.96	4.00	4.33
Equitability index	.24	.36	.36
Dominant species (percent abundance)	Simulium vittatum (36) Nais elinguis (10) Nais communis (7)	Stenelmis markeli (25) Dugesia tigrina (14) Chimarra obscura (9) Helicopsyche borealils (7)	Caenis sp. (22) Dugesia tigrina (17) Psephenus herricki (11)
Group (percent abundance)			
Worms	28	<1	6
Crustaceans	<1	1	1
Mayflies	3	8	22
Caddisflies	1	23	8
Physa snails	0	0	<1
Ecological niche (percent abundance)			
Predator	11	6	5
Scavenger	4	15	18
Filter feeder	46	29	17
Detritivore	25	8	28
Herbivore	12	26	6
Omnivore	<1	1	8
Periphyton feeder	2	15	17
Pollutional classification (percent abundance)			
Tolerant	8	15	31
Facultative	78	34	40
Intolerant	14	51	29

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987--Continued

STONY BROOK SITE 01400880	Spring	Summer	Fall
Taxa	65	59	61
MI/SF	250.7	307	199.7
Species diversity index	4.49	4.15	4.37
Equitability index	.52	.44	.50
Dominant species (percent abundance)	Psephenus herricki (20) Neocloeon sp. (16) Slavina appendiculata (7) Orthocladius thienemanni (6) Stenelmis markeli (5)	Rheotanytarsus exigua (24) Psephenus herricki (14) Cricotopus bicinctus (12)	Cheumatopsyche sp. (26) Ferrissia rivularis (9) Stenonema fuscum (8) Stenonema interpunctatum (8)
Group (percent abundance)			
Worms	13	1	5
Crustaceans	<1	<1	1
Mayflies	26	7	23
Caddisflies	2	10	30
Physa snails	0	<1	2
Ecological niche (percent abundance)			
Predator	8	7	6
Scavenger	1	1	5
Filter feeder	4	40	6
Detritivore	34	6	15
Herbivore	27	26	14
Omnivore	3	1	10
Periphyton feeder	2	19	43
Pollutional classification (percent abundance)			
Tolerant	2	2	5
Facultative	48	70	59
Intolerant	50	28	35

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987--Continued

STONY BROOK SITE 01400840

	Spring	Summer[1]	Fall
Taxa	78		45
MI/SF	1,270.3		186
Species diversity index	3.74		4.04
Equitability index	.25		.53
Dominant species (percent abundance)	Chaetogaster diaphanus (40) Orthocladius paradorenus (8) Cricotopus junus (8)		Dugesia tigrina (16) Slavina appendiculata (15) Stenelmis markeli (14) Paludicella articulata (10)
Group (percent abundance)			
Worms	46		5
Crustaceans	<1		1
Mayflies	1		23
Caddisflies	0		30
Physa snails	0		2
Ecological niche (percent abundance)			
Predator	43		10
Scavenger	1		26
Filter feeder	13		18
Detritivore	17		21
Herbivore	25		14
Omnivore	<1		7
Periphyton feeder	<1		3
Pollutional classification (percent abundance)			
Tolerant	2		23
Facultative	73		55
Intolerant	25		22

[1] Qualitative sample

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987--Continued

BEDEN BROOK SITE 01401600

	Spring	Summer	Fall
Taxa	68	75	63
MI/SF	420.3	1,095.7	404
Species diversity index	4.62	4.49	3.97
Equitability index	.53	.45	.37
Dominant species (percent abundance)	Cricotopus slossonae (12) Stenelmis markeli (9) Nais communis (9) Neocloeon sp. (7) Chaetogaster diaphanus (7)	Rheotanytarsus exigua (19) Chimarra obscura (14) Polypedilum convictum (11) Neocloeon sp. (9)	Chimarra obscura (21) Stenelmis markeli (15) Cheumatopsyche sp. (14)
Group (percent abundance)			
Worms	29	1	3
Crustaceans	<1	<1	<1
Mayflies	11	13	6
Caddisflies	2	29	46
Physa snails	0	0	0
Ecological niche (percent abundance)			
Predator	9	3	5
Scavenger	1	6	9
Filter feeder	9	59	50
Detritivore	33	14	8
Herbivore	36	10	19
Omnivore	1	<1	1
Periphyton feeder	12	7	7
Pollutional classification (percent abundance)			
Tolerant	4	7	8
Facultative	67	62	43
Intolerant	29	31	49

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987--Continued

BEDEN BROOK SITE 01401545

	Spring	Summer	Fall
Taxa	97	46	71
MI/SF	1,394	243.7	472
Species diversity index	4.98	4.13	3.91
Equitability index	.48	.57	.31
Dominant species (percent abundance)	Cricotopus exilis (11) Cricotopus slossonae (15) Psephenus herricki (6) Cricotopus bicinctus (6) Stenelmis markeli (5) Neocloeon sp. (5) Nais communis (4) Rheotanytarsus exigua (4)	Psephenus herricki (20) Stenelmis markeli (11) Chimarra obscura (10) Hydropsyche betteni (7) Rheotanytarsus exigua (7)	Chimarra obscura (32) Ephemerella invaria (10) Dugesia tigrina (10)
Group (percent abundance)			
Worms	29	1	3
Crustaceans	<1	<1	<1
Mayflies	11	13	6
Caddisflies	2	29	46
Physa snails	0	0	0
Ecological niche (percent abundance)			
Predator	9	3	5
Scavenger	1	6	9
Filter feeder	9	59	50
Detritivore	33	14	8
Herbivore	36	10	19
Omnivore	1	<1	1
Periphyton feeder	12	7	7
Pollutional classification (percent abundance)			
Tolerant	4	7	8
Facultative	67	62	43
Intolerant	29	31	49

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987--Continued

BEDEN BROOK SITE 01401530

	Spring	Summer	Fall
Taxa	83	80	64
MI/SF	1,657.7	1,097.3	1,115
Species diversity index	4.58	4.03	3.21
Equitability index	.43	.30	.20
Dominant species (percent abundance)	Nais pseudobtusa (15) Nais simplex (10) Orthocladius thienemanni (8) Nais bretscheri (8) Nais elinguis (8) Simulium vittatum (6)	Symphitopsyche bifida (23) Cheumatopsyche sp. (18) Neocloeon (9)	Cheumatopsyche sp. (32) Symphitopsyche bifida (28)
Group (percent abundance)			
Worms	48	<1	<1
Crustaceans	0	<1	<1
Mayflies	7	11	8
Caddisflies	1	58	71
Physa snails	<1	0	<1
Ecological niche (percent abundance)			
Predator	3	4	3
Scavenger	<1	2	5
Filter feeder	11	58	72
Detritivore	54	11	9
Herbivore	29	10	4
Omnivore	1	3	2
Periphyton feeder	2	11	5
Pollutional classification (percent abundance)			
Tolerant	11	4	7
Facultative	70	55	53
Intolerant	19	42	39

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987--Continued

BEDEN BROOK SITE 01401521	Spring	Summer	Fall
Taxa	77	67	63
MI/SF	1,053.3	570.7	750
Species diversity index	4.61	4.04	3.50
Equitability index	.47	.35	.26
Dominant species (percent abundance)	Nais communis (22) Stenelmis markeli (9) Nais elinguis (7) Hydropsyche betteni (4) Orthocladius paradorenus (3) Psephenus herricki (3)	Hydropsyche betteni (19) Cheumatopsyche sp. (16) Neocloeon (9)	Hydropsyche betteni (39) Cheumatopsyche sp. (11)
Group (percent abundance)			
Worms	35	<1	<1
Crustaceans	<1	<1	<1
Mayflies	11	8	6
Caddisflies	8	43	56
Physa snails	0	<1	<1
Ecological niche (percent abundance)			
Predator	3	4	4
Scavenger	2	4	6
Filter feeder	14	67	71
Detritivore	48	8	6
Herbivore	28	11	8
Omnivore	2	1	1
Periphyton feeder	4	4	3
Pollutional classification (percent abundance)			
Tolerant	3	4	6
Facultative	66	70	74
Intolerant	31	25	20

Table 11.--Statistical summary of results of biological analyses of stream samples from sites on Jacobs Creek, Stony Brook, and Beden Brook, 1987--Continued

BEDEN BROOK SITE 01401520

	Spring	Summer	Fall
Taxa	74	89	40
MI/SF	575.7	2,558	526.3
Species diversity index	5.04	3.84	2.87
Equitability index	.66	.23	.26
Dominant species (percent abundance)	Orthocladius paradorenus (9) Ephemerella dorothea (6) Cricotopus ceris (6) Psephenus herricki (5) Nais communis (5) Cricotopus exilis (5) Orthocladius thienemanni (5)	Hydropsyche betteni (24) Cheumatopsyche sp. (19) Symphitopsyche bifida (11)	Hydropsyche betteni (34) Cheumatopsyche sp. (31)
Group (percent abundance)			
Worms	16	<1	0
Crustaceans	0	<1	<1
Mayflies	17	7	74
Caddisflies	4	57	74
Physa snails	0	0	<1
Ecological niche (percent abundance)			
Predator	7	4	2
Scavenger	2	3	8
Filter feeder	6	74	78
Detritivore	33	7	6
Herbivore	41	6	2
Omnivore	1	1	1
Periphyton feeder	9	6	2
Pollutional classification (percent abundance)			
Tolerant	4	3	2
Facultative	52	72	71
Intolerant	44	24	20